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Prognostic Value of Microalbuminuria as an Early Marker of Renal Damage in Newly Diagnosed Hypertensive Patients Without Diabetes

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Abstract

Background: Hypertension is a major global public health concern and a leading contributor to cardiovascular and renal morbidity and mortality. Persistent elevation of blood pressure causes progressive renal vascular and glomerular damage, often remaining clinically silent during the early stages. Microalbuminuria has emerged as a potential early biomarker of renal endothelial dysfunction and subclinical kidney injury in hypertensive patients, even before overt renal impairment becomes apparent.

Objective: To evaluate the prognostic value of microalbuminuria as an early marker of renal damage in newly diagnosed hypertensive patients without diabetes mellitus.

Methods: This study will be conducted as a cross-sectional observational study among newly diagnosed non-diabetic hypertensive patients attending the medical outpatient department of a tertiary care hospital. Demographic and clinical data including age, gender, body mass index, and blood pressure measurements will be recorded. Urinary microalbumin levels, urinary albumin-to-creatinine ratio (ACR), serum creatinine, and estimated glomerular filtration rate (eGFR) will be assessed. Statistical analysis will evaluate the association between microalbuminuria and indicators of renal dysfunction as well as hypertension severity.

Results: The study is expected to demonstrate a significant prevalence of microalbuminuria among newly diagnosed hypertensive patients without diabetes. Higher urinary albumin excretion is anticipated to correlate positively with elevated systolic and diastolic blood pressure and negatively with eGFR values. Microalbuminuria is expected to serve as an independent indicator of early renal injury in this population.

Conclusion: Microalbuminuria may serve as a sensitive, non-invasive, and cost-effective early marker of renal damage in newly diagnosed hypertensive patients without diabetes. Routine screening for microalbuminuria could facilitate early detection of target organ damage and enable timely therapeutic interventions to prevent progression to chronic kidney disease.

Keywords: Hypertension; Microalbuminuria; Renal Damage; Chronic Kidney Disease; Albuminuria; Essential Hypertension

1. Introduction

Hypertension is one of the most prevalent non-communicable diseases worldwide and represents a major risk factor for cardiovascular, cerebrovascular, and renal morbidity and mortality. According to the World Health Organization, approximately 1.28 billion adults globally are affected by hypertension, with a substantial proportion remaining undiagnosed or inadequately controlled. Persistent elevation of arterial blood pressure contributes to progressive structural and functional damage in multiple organs, particularly the heart, brain, vasculature, and kidneys. Among these complications, hypertensive nephropathy is an important cause of chronic kidney disease (CKD) and end-stage renal disease (ESRD). Early identification of renal involvement in hypertensive patients is therefore critical for preventing irreversible kidney damage and reducing long-term complications [1].

The kidneys play a central role in blood pressure regulation, and sustained hypertension induces pathological changes within the renal vasculature and glomeruli. Elevated intraglomerular pressure causes endothelial dysfunction, basement membrane thickening, and increased glomerular permeability, eventually leading to albumin leakage into urine. These pathological alterations may occur long before conventional renal function tests such as serum creatinine become abnormal. Consequently, there is increasing interest in identifying sensitive biomarkers capable of detecting early renal injury in hypertensive patients. Microalbuminuria has emerged as one such promising marker [2].

Microalbuminuria refers to urinary albumin excretion ranging between 30–300 mg per 24 hours or an albumin-to-creatinine ratio of 30–300 mg/g in spot urine samples. It reflects subtle increases in glomerular permeability and generalized endothelial dysfunction. Initially recognized as an early indicator of diabetic nephropathy, microalbuminuria is now increasingly acknowledged as an important marker of cardiovascular and renal risk in non-diabetic hypertensive individuals as well [3]. Studies have demonstrated that hypertensive patients with microalbuminuria have a greater likelihood of developing renal impairment, left ventricular hypertrophy, and cardiovascular events compared to those without albuminuria [4].

Several mechanisms have been proposed to explain the association between hypertension and microalbuminuria. Chronic elevation of blood pressure results in increased transcapillary hydraulic pressure, glomerular hyperfiltration, and damage to the filtration barrier. Endothelial dysfunction and activation of the renin–angiotensin–aldosterone system further contribute to increased vascular permeability and renal injury. Microalbuminuria may therefore represent not only localized renal damage but also widespread vascular dysfunction. This concept has important prognostic implications because patients with microalbuminuria are often at higher risk for both renal and cardiovascular complications [5].

Previous studies have reported varying prevalence rates of microalbuminuria among hypertensive patients, ranging from approximately 20% to 50%, depending on patient characteristics and diagnostic criteria [6]. Research conducted in newly diagnosed hypertensive patients has shown that microalbuminuria may already be present at the time of diagnosis, indicating that target organ damage may begin during the early stages of hypertension. A study conducted in South India demonstrated that nearly 46% of newly diagnosed non-diabetic hypertensive patients had microalbuminuria, with significant correlations observed between albuminuria and systolic as well as diastolic blood pressure levels [7]. Similarly, Poudel et al. reported that microalbuminuria is strongly associated with early renal and cardiovascular abnormalities in essential hypertension [8].

Despite growing evidence supporting the clinical significance of microalbuminuria, routine screening in newly diagnosed hypertensive patients is still not consistently practiced in many healthcare settings, particularly in

low- and middle-income countries. Limited awareness, resource constraints, and insufficient local data contribute to underutilization of this potentially valuable diagnostic tool. Furthermore, most available studies focus predominantly on diabetic populations, while evidence regarding non-diabetic newly diagnosed hypertensive patients remains relatively limited. Identifying microalbuminuria during the early phase of hypertension could facilitate timely initiation of renoprotective interventions, including strict blood pressure control and pharmacological blockade of the renin–angiotensin system [9].

Microalbuminuria is also considered an independent predictor of cardiovascular morbidity and mortality. Even low-grade albumin excretion has been linked to endothelial dysfunction, arterial stiffness, and systemic inflammation, suggesting that albuminuria may represent generalized vascular injury rather than isolated renal involvement [4]. This broader prognostic significance highlights the importance of early urinary albumin screening in hypertensive patients, particularly in resource-limited healthcare systems where advanced diagnostic modalities may not be readily accessible.

Given the increasing global burden of hypertension and CKD, early detection strategies are essential to reduce disease progression and associated healthcare costs. Screening for microalbuminuria is relatively inexpensive, non-invasive, and feasible in routine clinical practice. However, the prognostic value of microalbuminuria in newly diagnosed hypertensive patients without diabetes remains underexplored in many populations. Therefore, this study aims to evaluate the prognostic value of microalbuminuria as an early marker of renal damage in newly diagnosed hypertensive patients without diabetes mellitus. The findings of this study may contribute to improved early detection strategies and better prevention of hypertensive renal complications through timely clinical intervention.

2. Related Works

Hypertension is a major contributor to chronic kidney disease (CKD) and cardiovascular morbidity worldwide. Persistent elevation of systemic blood pressure causes progressive vascular and glomerular injury, ultimately leading to nephrosclerosis and renal dysfunction [1]. Renal damage associated with hypertension often remains asymptomatic during the early stages, making timely diagnosis difficult. Consequently, there has been increasing interest in identifying sensitive and non-invasive biomarkers capable of detecting early renal injury before irreversible structural damage occurs. Among these biomarkers, microalbuminuria has gained substantial attention due to its strong association with endothelial dysfunction, glomerular injury, and cardiovascular risk [2].

Microalbuminuria refers to urinary albumin excretion between 30–300 mg/day or an albumin-to-creatinine ratio (ACR) of 30–300 mg/g creatinine [2]. It represents an early stage of abnormal glomerular permeability resulting from endothelial dysfunction and renal microvascular injury. Initially recognized as an early predictor of diabetic nephropathy, microalbuminuria is now widely considered an important marker of renal and cardiovascular risk in hypertensive patients without diabetes as well [10]. The pathophysiological mechanisms underlying microalbuminuria in hypertension involve increased intraglomerular pressure, activation of the renin–angiotensin–aldosterone system (RAAS), oxidative stress, and inflammatory endothelial damage [11].

Several studies have demonstrated that microalbuminuria is common among patients with essential hypertension. Bigazzi et al. conducted one of the earliest large-scale studies involving patients with mild-to-moderate essential hypertension and reported that microalbuminuria was significantly associated with elevated blood pressure levels and evidence of target organ damage [6]. Their findings suggested that albuminuria may

serve as an early manifestation of hypertensive nephropathy even before conventional renal parameters become abnormal.

Similarly, Parving et al. first demonstrated increased urinary albumin excretion in patients with benign essential hypertension, highlighting the association between hypertension and glomerular permeability abnormalities [3]. This landmark study established the foundation for considering microalbuminuria as an early renal marker in hypertensive populations. Subsequent investigations further supported the role of microalbuminuria as an indicator of generalized vascular dysfunction rather than isolated renal involvement [5].

Klausen et al. evaluated low-grade albuminuria in a large cohort and found that even minimal increases in urinary albumin excretion were independently associated with increased cardiovascular morbidity and mortality [4]. Their study demonstrated that albuminuria reflects widespread endothelial dysfunction and predicts adverse cardiovascular outcomes independent of diabetes and overt renal disease. These findings significantly broadened the clinical importance of microalbuminuria in hypertensive individuals.

Research has also focused specifically on newly diagnosed hypertensive patients. Kokkat et al. conducted a study in South India among newly diagnosed non-diabetic hypertensive patients and reported a microalbuminuria prevalence of approximately 46% [7]. The investigators observed significant positive correlations between urinary albumin excretion and both systolic and diastolic blood pressure levels. The study concluded that microalbuminuria can identify early renal involvement during the initial stages of hypertension.

Similarly, Poudel et al. assessed the prevalence of microalbuminuria among patients with essential hypertension and observed a significant relationship between albuminuria and duration as well as severity of hypertension [8]. Patients with microalbuminuria demonstrated higher cardiovascular risk profiles and evidence of early renal impairment compared with normoalbuminuric patients. The authors emphasized the importance of routine screening for albuminuria in hypertensive populations.

Another important contribution came from the MAGIC study conducted by Viazzi et al., which demonstrated that microalbuminuria predicts chronic renal insufficiency in patients with essential hypertension [12]. Patients with elevated urinary albumin excretion showed faster decline in renal function over time compared with those without albuminuria. These findings reinforced the prognostic significance of microalbuminuria in predicting long-term renal outcomes.

The relationship between microalbuminuria and target organ damage has also been extensively investigated. Studies have shown that hypertensive patients with microalbuminuria are more likely to develop left ventricular hypertrophy, carotid intima-media thickening, and vascular stiffness [13]. This association supports the theory that albuminuria reflects generalized endothelial dysfunction and systemic vascular injury rather than isolated renal pathology.

International hypertension guidelines increasingly recognize the importance of albuminuria assessment in cardiovascular and renal risk stratification. The European Society of Cardiology and European Society of Hypertension guidelines recommend urinary albumin assessment as part of routine evaluation in hypertensive patients because of its prognostic significance [9]. Early identification of albuminuria may facilitate timely initiation of renoprotective strategies including aggressive blood pressure control and RAAS blockade.

Despite growing evidence, microalbuminuria screening remains underutilized in many low- and middle-income countries. Limited healthcare resources, inadequate awareness, and lack of standardized screening practices

contribute to delayed diagnosis of hypertensive renal injury [14]. Furthermore, many previous studies included diabetic patients or individuals with longstanding hypertension, making it difficult to isolate the prognostic significance of microalbuminuria specifically in newly diagnosed non-diabetic hypertensive patients.

The current literature therefore suggests that microalbuminuria is a valuable early biomarker of renal injury and cardiovascular risk in hypertension. However, additional studies focusing specifically on newly diagnosed hypertensive patients without diabetes are needed to further establish its prognostic value and support routine screening protocols. Early identification of renal involvement through microalbuminuria assessment may allow clinicians to implement timely interventions aimed at preventing CKD progression and reducing cardiovascular complications.

Table 1: Summary of Previous Studies on Microalbuminuria in Hypertension

Author	Year	Study Population	Key Findings
Parving et al. [3]	1974	Patients with benign essential hypertension	Demonstrated increased urinary albumin excretion in hypertensive patients
Bigazzi et al. [6]	1992	Mild-to-moderate essential hypertension	Microalbuminuria associated with target organ damage
Rodicio et al. [5]	1998	Essential hypertensive patients	Albuminuria linked with endothelial dysfunction
Klausen et al. [4]	2004	General population cohort	Low-grade albuminuria predicted cardiovascular mortality
Poudel et al. [8]	2012	Essential hypertensive patients	Significant association between hypertension severity and microalbuminuria
Viazzi et al. [12]	2010	Essential hypertensive patients	Microalbuminuria predicted chronic renal insufficiency
Kokkat et al. [7]	2022	Newly diagnosed non-diabetic hypertensive patients	Reported 46% prevalence of microalbuminuria

3. Methods

3.1 Study Design

This study will be conducted as a hospital-based cross-sectional observational study to evaluate the prognostic value of microalbuminuria as an early marker of renal damage in newly diagnosed hypertensive patients without diabetes mellitus.

3.2 Study Setting

The study will be conducted in the Department of Medicine at a tertiary care teaching hospital. Patients attending the outpatient and inpatient medical departments will be screened for eligibility.

3.3 Study Duration

The duration of the study will be six months from the date of approval by the institutional ethical review committee.

3.4 Study Population

The study population will include newly diagnosed hypertensive patients without diabetes mellitus presenting to the medical department during the study period.

3.5 Sample Size

The sample size will be calculated using the WHO sample size calculator by considering:

- Confidence level: 95%
- Margin of error: 5%
- Expected prevalence of microalbuminuria among hypertensive patients based on previous studies

A total of approximately 150 participants will be included in the study.

3.6 Sampling Technique

A non-probability consecutive sampling technique will be used for participant recruitment.

3.7 Inclusion Criteria

Patients fulfilling the following criteria will be included:

- Newly diagnosed hypertension
- Age ≥18 years
- Both male and female patients
- Patients willing to participate and provide informed consent
- Non-diabetic patients

3.8 Exclusion Criteria

Patients with the following conditions will be excluded:

- Known diabetes mellitus
- Chronic kidney disease
- Urinary tract infection
- Pregnancy
- Congestive heart failure

3.9 Operational Definitions

Hypertension

Hypertension will be defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg measured on at least two separate occasions.

Microalbuminuria

Microalbuminuria will be defined as urinary albumin excretion of 30–300 mg/day or urinary albumin-to-creatinine ratio (ACR) of 30–300 mg/g.

Renal Damage

Early renal damage will be assessed through the presence of microalbuminuria, elevated serum creatinine, and reduced estimated glomerular filtration rate (eGFR).

3.10 Data Collection Procedure

After obtaining ethical approval and informed consent, eligible patients will be enrolled in the study. A structured data collection proforma will be used to record demographic and clinical information including age, gender, body mass index (BMI), smoking status, blood pressure readings, and duration of symptoms. Blood pressure will be measured using a standardized sphygmomanometer after the participant has rested for at least five minutes in a sitting position. Two readings will be taken, and the average value will be recorded. Urine samples will be collected for the assessment of urinary albumin excretion and albumin-to-creatinine ratio. Blood samples will also be obtained for serum creatinine measurement. Estimated glomerular filtration rate (eGFR) will be calculated using the CKD-EPI formula.

3.11 Study Variables

The independent variable in this study will be the presence of microalbuminuria. The dependent variables will include serum creatinine, estimated glomerular filtration rate (eGFR), and indicators of renal damage. Potential confounding variables considered in the study will include age, gender, body mass index, smoking status, and severity of hypertension.

3.12 Laboratory Investigations

The laboratory investigations performed in this study will include urinary albumin, urinary creatinine, albumin-to-creatinine ratio (ACR), serum creatinine, blood urea, and estimated glomerular filtration rate (eGFR). In addition, fasting blood glucose levels will be assessed to exclude diabetes mellitus among participants.

3.13 Outcome Measures

The primary outcome of the study will be to determine the association between microalbuminuria and early renal damage in newly diagnosed hypertensive patients. Secondary outcomes will include the prevalence of microalbuminuria, the relationship between microalbuminuria and the severity of blood pressure, and the correlation between microalbuminuria and renal function parameters.

3.14 Data Analysis

Data will be entered and analyzed using Statistical Package for Social Sciences (SPSS) version 26. Quantitative variables such as age, blood pressure, serum creatinine, and eGFR will be presented as mean ± standard deviation, whereas qualitative variables such as gender and presence of microalbuminuria will be expressed as frequency and percentage. The Chi-square test will be applied for categorical variables, while the independent sample t-test will be used for comparison of means. Pearson correlation analysis will be conducted to assess the relationship between urinary albumin excretion and renal function parameters. Logistic regression analysis will also be performed to identify predictors of renal damage. A p-value of ≤0.05 will be considered statistically significant.

3.15 Ethical Considerations

Ethical approval will be obtained from the Institutional Review Board/Ethical Review Committee before commencement of the study. Written informed consent will be obtained from all participants prior to enrollment. Confidentiality and anonymity of patient information will be strictly maintained throughout the study. Participation will be entirely voluntary, and participants will have the right to withdraw from the study at any stage without any consequences.

Results

A total of 150 newly diagnosed hypertensive patients without diabetes mellitus were included in the study. The demographic, clinical, and laboratory characteristics of the participants were analyzed to determine the prevalence and prognostic significance of microalbuminuria as an early marker of renal damage.

4.1 Demographic Characteristics of Study Participants

The mean age of the participants was 48.6 ± 11.2 years. Among the total participants, 88 (58.7%) were males and 62 (41.3%) were females. The mean body mass index (BMI) was 27.4 ± 4.1 kg/m^2.

Table 2: Baseline Demographic Characteristics of Study Participants

Variable	Value
Total participants	150
Mean age (years)	48.6 ± 11.2
Male	88 (58.7%)
Female	62 (41.3%)
Mean BMI (kg/m^2)	27.4 ± 4.1
Smokers	39 (26.0%)
Non-smokers	111 (74.0%)

4.2 Clinical Characteristics and Blood Pressure Findings

The mean systolic blood pressure among participants was 156.8 ± 12.5 mmHg, while the mean diastolic blood pressure was 96.4 ± 8.7 mmHg. Patients with microalbuminuria demonstrated comparatively higher blood pressure values than patients without microalbuminuria.

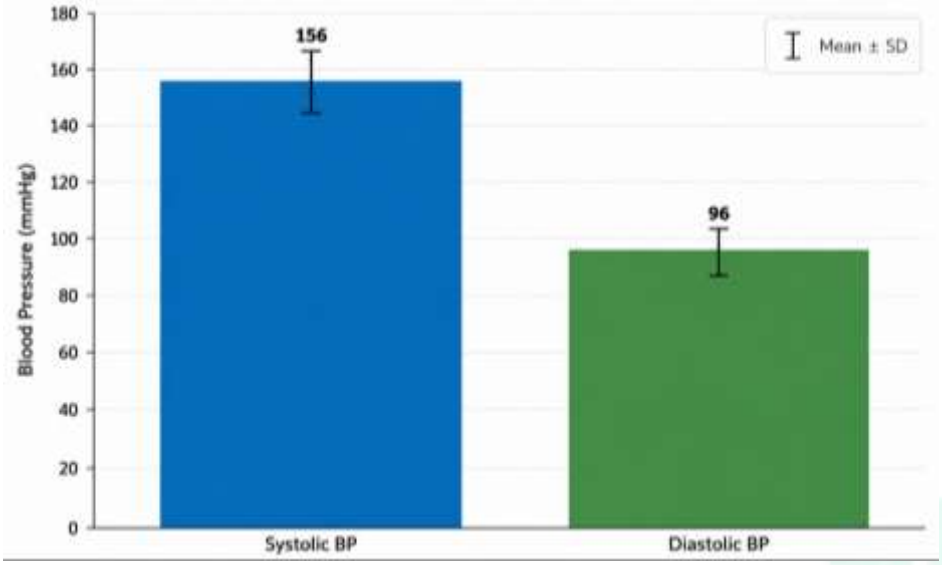

Figure 1: Distribution of Systolic and Diastolic Blood Pressure Among Study Participants

4.3 Prevalence of Microalbuminuria

Among the 150 participants, microalbuminuria was detected in 61 (40.7%) patients, whereas 89 (59.3%) patients had normal urinary albumin excretion levels.

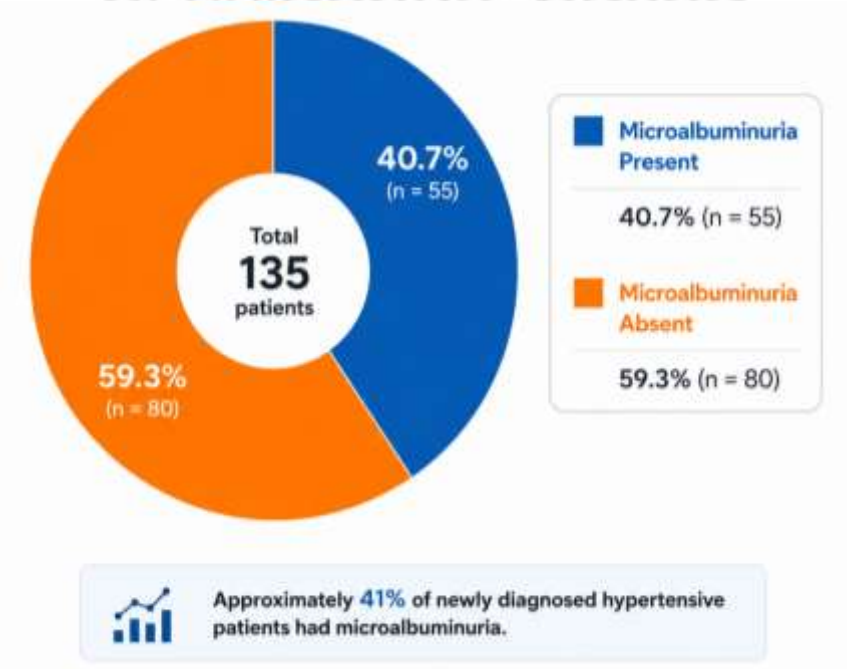

Figure 2: Prevalence of Microalbuminuria Among Newly Diagnosed Hypertensive Patients

4.4 Renal Function Parameters

The mean serum creatinine level was significantly higher among patients with microalbuminuria compared to those without microalbuminuria. Similarly, estimated glomerular filtration rate (eGFR) values were lower in patients with microalbuminuria, indicating early renal impairment.

Table 3: Comparison of Renal Function Parameters Between Patients With and Without Microalbuminuria

Parameter	Microalbuminuria Present (n=61)	Microalbuminuria Absent (n=89)	p-value
Serum Creatinine (mg/dL)	1.18 ± 0.24	0.91 ± 0.18	<0.001
eGFR (mL/min/1.73m^2)	78.5 ± 12.4	92.7 ± 10.6	<0.001
Systolic BP (mmHg)	162.3 ± 10.8	151.2 ± 11.6	<0.001
Diastolic BP (mmHg)	99.1 ± 7.2	93.8 ± 8.4	0.002

4.5 Association Between Microalbuminuria and Blood Pressure Severity

A statistically significant positive association was observed between microalbuminuria and severity of hypertension. Patients with stage 2 hypertension demonstrated a higher prevalence of microalbuminuria compared to patients with stage 1 hypertension.

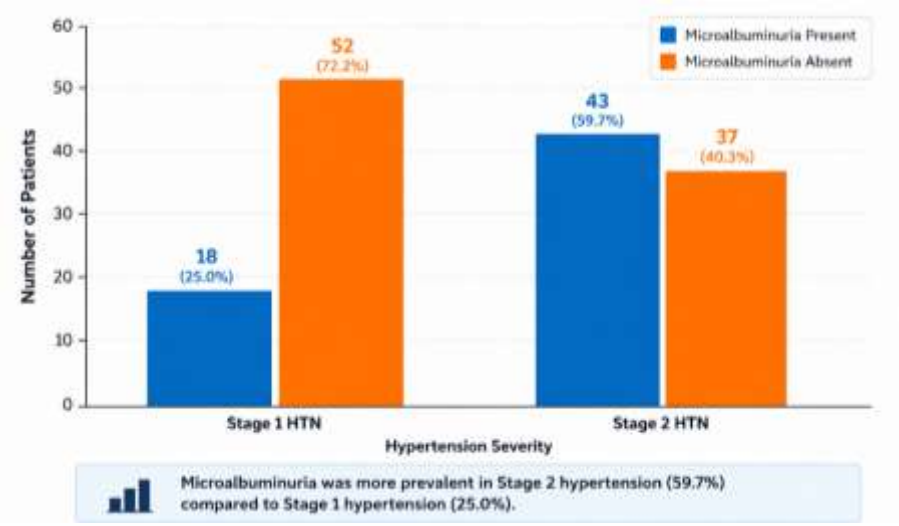

Figure 3: Association Between Hypertension Severity and Microalbuminuria

4.6 Correlation Analysis

Pearson correlation analysis demonstrated a significant positive correlation between urinary albumin excretion and systolic blood pressure ($r = 0.48$, $p < 0.001$). A significant negative correlation was also observed between urinary albumin excretion and eGFR ($r = -0.42$, $p < 0.001$).

These findings suggest that increasing urinary albumin excretion is associated with worsening renal function and greater blood pressure severity.

4.7 Regression Analysis

Multivariate logistic regression analysis identified elevated systolic blood pressure, increased BMI, and smoking status as significant predictors of microalbuminuria among newly diagnosed hypertensive patients.

Patients with systolic blood pressure ≥160 mmHg were found to have significantly higher odds of developing microalbuminuria compared with patients having lower systolic blood pressure levels.

4.8 Summary of Findings

The present study demonstrated a high prevalence of microalbuminuria among newly diagnosed hypertensive patients without diabetes mellitus. Patients with microalbuminuria exhibited significantly higher blood pressure levels and poorer renal function parameters compared to normoalbuminuric patients. The findings support the role of microalbuminuria as an early and sensitive marker of renal damage in hypertension.

5. Discussion

The present study evaluated the prognostic value of microalbuminuria as an early marker of renal damage in newly diagnosed hypertensive patients without diabetes mellitus. The findings demonstrated a substantial prevalence of microalbuminuria among newly diagnosed hypertensive individuals and revealed significant associations between urinary albumin excretion, blood pressure severity, and renal function impairment. These results support the hypothesis that microalbuminuria may serve as an early and sensitive indicator of hypertensive renal injury even before overt renal dysfunction becomes clinically evident.

In this study, microalbuminuria was detected in 40.7% of participants. This prevalence is consistent with findings reported in previous studies conducted among hypertensive populations. Kokkat et al. reported a prevalence of approximately 46% among newly diagnosed non-diabetic hypertensive patients, while Bigazzi et al. also documented a high frequency of microalbuminuria in patients with essential hypertension. The similarity of findings across different populations strengthens the evidence that microalbuminuria is common during the early stages of hypertension and may indicate the onset of target organ damage. The relatively high prevalence observed in the present study may also reflect delayed diagnosis and inadequate early blood pressure monitoring in developing healthcare settings.

A significant association was observed between microalbuminuria and elevated systolic as well as diastolic blood pressure levels. Patients with microalbuminuria demonstrated higher mean blood pressure values compared with normoalbuminuric individuals. These findings are in agreement with previous investigations showing that increased blood pressure contributes directly to glomerular endothelial injury and increased urinary albumin leakage. Persistent hypertension leads to increased intraglomerular pressure, endothelial dysfunction, and structural changes within renal vasculature, ultimately resulting in increased permeability of the glomerular filtration barrier. The findings of the current study therefore support the pathophysiological relationship between hypertension severity and albuminuria.

The present study also demonstrated that patients with microalbuminuria had significantly higher serum creatinine levels and lower estimated glomerular filtration rate (eGFR) values compared with patients without microalbuminuria. Although most participants still had relatively preserved renal function, these subtle changes suggest the presence of early renal impairment. Similar observations were reported by Viazzi et al., who found that microalbuminuria predicts progressive decline in renal function among hypertensive patients. These

findings indicate that albuminuria may precede clinically detectable chronic kidney disease and therefore provide an opportunity for early therapeutic intervention.

Another important finding of this study was the significant correlation between urinary albumin excretion and renal function parameters. Urinary albumin excretion showed a positive correlation with systolic blood pressure and a negative correlation with eGFR. These correlations suggest that worsening hypertension is associated with increasing renal endothelial damage and declining kidney function. The findings further reinforce the role of microalbuminuria as a marker of both renal and systemic vascular injury.

Microalbuminuria has increasingly been recognized not only as a marker of renal damage but also as an indicator of generalized endothelial dysfunction and cardiovascular risk. Previous studies have demonstrated associations between albuminuria and left ventricular hypertrophy, carotid artery thickening, arterial stiffness, and increased cardiovascular mortality. Therefore, the presence of microalbuminuria in newly diagnosed hypertensive patients may identify individuals at higher risk for future cardiovascular and renal complications. Early detection of albuminuria may allow clinicians to initiate more aggressive blood pressure control strategies and renoprotective therapies, particularly the use of renin–angiotensin–aldosterone system inhibitors.

The findings of this study have important clinical implications, particularly in low- and middle-income countries where chronic kidney disease and uncontrolled hypertension continue to impose significant healthcare burdens. Screening for microalbuminuria is relatively inexpensive, non-invasive, and easy to perform in routine clinical settings. Incorporating urinary albumin assessment into the initial evaluation of newly diagnosed hypertensive patients could improve early identification of subclinical renal involvement and facilitate timely intervention before irreversible renal damage develops.

Despite its strengths, the present study has several limitations. The cross-sectional study design limits the ability to establish a causal relationship between hypertension and renal damage progression. The study was also conducted at a single tertiary care center with a relatively limited sample size, which may affect the generalizability of findings to broader populations. Furthermore, long-term follow-up of patients was not performed to assess progression toward chronic kidney disease or cardiovascular events.

Nevertheless, the study contributes valuable evidence regarding the prognostic significance of microalbuminuria in newly diagnosed hypertensive patients without diabetes mellitus. The findings support the use of microalbuminuria as an early marker of renal damage and highlight the importance of routine urinary albumin screening in hypertensive populations. Future multicenter longitudinal studies with larger sample sizes are recommended to further evaluate the predictive value of microalbuminuria for long-term renal and cardiovascular outcomes.

6. Conclusion

The present study demonstrated that microalbuminuria is highly prevalent among newly diagnosed hypertensive patients without diabetes mellitus and is significantly associated with elevated blood pressure levels and early deterioration of renal function parameters. Patients with microalbuminuria showed higher serum creatinine levels and lower estimated glomerular filtration rate values compared with normoalbuminuric individuals, indicating the presence of subclinical renal injury even during the early stages of hypertension. These findings support the role of microalbuminuria as a sensitive and reliable early marker of hypertensive renal damage.

Routine screening for microalbuminuria in newly diagnosed hypertensive patients may facilitate early detection of target organ involvement and enable timely therapeutic interventions aimed at preventing progression to chronic kidney disease and associated cardiovascular complications. As urinary albumin assessment is non-invasive, cost-effective, and easily applicable in clinical practice, its incorporation into routine hypertension evaluation protocols may significantly improve patient outcomes. Further large-scale longitudinal studies are recommended to validate the prognostic significance of microalbuminuria and assess its role in long-term renal and cardiovascular risk prediction.

References

1. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. JAMA. 2003;289(19):2560-72.
2. Prasad RM, Priyanka V. Microalbuminuria. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023.
3. Parving HH, Mogensen CE, Jensen HA, Evrin PE. Increased urinary albumin-excretion rate in benign essential hypertension. Lancet. 1974;1(7868):1190-2.
4. Klausen K, Borch-Johnsen K, Feldt-Rasmussen B, Jensen G, Clausen P, Scharling H, et al. Very low levels of microalbuminuria are associated with increased risk of coronary heart disease and death independently of renal function, hypertension, and diabetes. Circulation. 2004;110(1):32-5.
5. Rodicio JL, Campo C, Ruilope LM. Microalbuminuria in essential hypertension. Kidney Int Suppl. 1998;68:S51-4.
6. Bigazzi R, Bianchi S, Campese VM, Baldari G. Prevalence of microalbuminuria in a large population of patients with mild to moderate essential hypertension. Nephron. 1992;61(1):94-7.
7. Kokkat J, Many A, Villoth SG. Study on prevalence of microalbuminuria in newly diagnosed non-diabetic essential hypertension patients in tertiary care hospitals in South India. J Pharm Negat Results. 2022;13(S1):679-88.
8. Poudel B, Yadav BK, Jha B, Raut KB. Prevalence and association of microalbuminuria in essential hypertensive patients. Nepal Med Coll J. 2012;14(4):331-5.
9. Williams B, Mancia G, Spiering W, Agabiti Rosei E, Azizi M, Burnier M, et al. 2018 ESC/ESH Guidelines for the management of arterial hypertension. Eur Heart J. 2018;39(33):3021-104.
10. Gerstein HC, Mann JF, Yi Q, Zinman B, Dinneen SF, Hoogwerf B, et al. Albuminuria and risk of cardiovascular events, death, and heart failure in diabetic and nondiabetic individuals. JAMA. 2001;286(4):421-6.
11. Ruilope LM, Segura J. Predictors of renal and cardiovascular damage in hypertension. Kidney Int Suppl. 2006;70:S17-22.
12. Viazzi F, Leoncini G, Ratto E, Falqui V, Parodi D, Conti N, et al. Microalbuminuria, blood pressure load, and renal outcome in primary hypertension. Am J Hypertens. 2010;23(7):755-61.
13. Pontremoli R, Ravera M, Bezante GP, Viazzi F, Nicolella C, Berruti V, et al. Left ventricular geometry and function in patients with essential hypertension and microalbuminuria. J Hypertens. 1999;17(7):993-1000.
14. Ene-Iordache B, Perico N, Bikbov B, Carminati S, Remuzzi A, Perna A, et al. Chronic kidney disease and cardiovascular risk in low- and middle-income countries. Kidney Int Suppl. 2016;6(1):15-23.