International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 24s, 2025
https://theaspd.com/index.php

Association of Serum Uric Acid and Microalbuminuria in Essential Hypertension: A Cross-Sectional Study

Dr Sagar M K[1], Dr Ravi B Nagarajaiah[2], Dr Divakar Gowda C P3, Dr M S Manjesh[1], Dr Pavan M[1], Dr Pooja J[1]

[1]Junior Resident, Department of General Medicine, Adichunchanagiri Institute of Medical Sciences, Adichunchanagiri University, B G Nagara, 571448, Karnataka, India

[2]Professor, Department of General Medicine, Adichunchanagiri Institute of Medical Sciences, Adichunchanagiri University, B G Nagara, 571448, Karnataka, India

[3]Assistant Professor, Department of General Medicine, Adichunchanagiri Institute of Medical Sciences, Adichunchanagiri University, B G Nagara, 571448, Karnataka, India

[*]**Corresponding Author:** Sagar M K, Junior Resident, Department of General Medicine, Adichunchanagiri Institute of Medical Sciences, Adichunchanagiri University, B G Nagara, 571448, Karnataka, India

ABSTRACT

Background: *Essential hypertension is a major risk factor for cardiovascular and renal complications. Elevated serum uric acid (SUA) and microalbuminuria (MAU) are independent predictors of endothelial dysfunction and adverse outcomes. This study aimed to determine the prevalence of hyperuricemia and microalbuminuria in essential hypertension and assess their association.*

Methods: *A cross-sectional study was conducted among 100 hypertensive patients aged 18–80 years at Adichunchanagiri Hospital, B.G. Nagara. Patients with chronic kidney disease, diabetes, hypothyroidism, hyperuricemia treatment, renal artery disease, or secondary hypertension were excluded. Clinical evaluation and laboratory tests (SUA, urine albumin-creatinine ratio, renal function, blood glucose, thyroid profile) were performed. Hyperuricemia was defined as SUA >7.0 mg/dL in men and >6.0 mg/dL in women; microalbuminuria as urinary albumin excretion of 30–300 mg/day.*

Results: *Hyperuricemia was present in 22% and microalbuminuria in 24% of patients. Among hyperuricemic patients, 86.4% had microalbuminuria ($p < 0.001$). Mean SUA was significantly higher in patients with microalbuminuria (7.30 ± 0.44 mg/dL) compared to those without (5.11 ± 1.02 mg/dL).*

Conclusion: *A significant positive association exists between SUA and microalbuminuria in essential hypertension. Screening for both parameters can help identify high-risk patients earlier, enabling timely interventions to reduce renal and cardiovascular complications.*

Key words: *Serum uric acid, Microalbuminuria, Hyperuricemia, Essential hypertension*

INTRODUCTION

Essential hypertension accounts for up to 95% of hypertension cases and is a major contributor to cardiovascular and renal morbidity. Even in asymptomatic patients, target organ damage (TOD) such as left ventricular hypertrophy, retinopathy, and microvascular injury may occur. Microalbuminuria, defined as urinary albumin excretion between 30–300 mg/day, is a sensitive marker of endothelial dysfunction and an early predictor of cardiovascular and renal disease. Elevated SUA, a byproduct of purine metabolism, has been implicated in oxidative stress, endothelial injury, and activation of the renin–angiotensin system. This study was undertaken to estimate the prevalence of hyperuricemia and microalbuminuria in patients with essential hypertension and to evaluate the association between these two parameters.

METHODS

Study design & setting: Cross-sectional study conducted over 18 months at Adichunchanagiri Hospital, B.G. Nagara.

Sample size & sampling: 100 hypertensive patients, purposive sampling.

Inclusion criteria:

- Age 18–80 years
- Diagnosed essential hypertension
- Willing to provide informed consent

Exclusion criteria:
- Chronic kidney disease
- Diabetes mellitus
- Hypothyroidism
- Hyperuricemia treatment
- Secondary hypertension

Assessments:
- History and physical examination
- Blood pressure measurement
- Laboratory tests: SUA, renal function, urine protein-creatinine ratio, blood glucose, thyroid profile
- ECG and relevant imaging

Definitions:
- Hyperuricemia: SUA >7.0 mg/dL (men), >6.0 mg/dL (women)
- Microalbuminuria: Urinary albumin excretion 30–300 mg/day

Statistical significance was set at $p < 0.05$.

RESULTS

Table 1: Demographic characteristics (n = 100)

Variable	Mean ± SD / n (%)
Age (years)	53.45 ± 11.66
Age group 51–60 years	27 (27%)
Age group 61–70 years	30 (30%)
Male	71 (71%)
Female	29 (29%)
Family history of HTN	12 (12%)
Smokers	37 (37%)
BMI (kg/m²)	24.74 ± 2.46

Table 2: Clinical and laboratory parameters

Parameter	Mean ± SD
Systolic BP (mmHg)	161.70 ± 15.35
Diastolic BP (mmHg)	101.44 ± 9.44
Random blood sugar (mg/dL)	107.20 ± 30.18
Blood urea (mg/dL)	28.99 ± 6.01
Serum creatinine (mg/dL)	0.93 ± 0.21
Serum uric acid (mg/dL)	5.63 ± 1.31

Table 3: Prevalence of comorbidities and complications

Condition	n (%)
Left ventricular hypertrophy	15
Coronary artery disease	29
CVA / TIA	16
Peripheral arterial disease	1
Hypertensive retinopathy	46
Any target organ damage	69

Table 4: Prevalence of hyperuricemia and microalbuminuria

Variable	n (%)
Hyperuricemia	22
Microalbuminuria	24

Table 5: Association between hyperuricemia and microalbuminuria

Hyperuricemia	MAU present	MAU absent	Total	% with MAU
Yes	19	3	22	86.4%
No	5	73	78	6.4%

Table 6: SUA levels by microalbuminuria status

MAU status	Mean SUA ± SD (mg/dL)
Present	7.30 ± 0.44
Absent	5.11 ± 1.02

DISCUSSION

This study found a high prevalence of both hyperuricemia and microalbuminuria among essential hypertensive patients, with a strong positive association between the two. The findings align with previous research showing SUA as a potential predictor of renal injury and cardiovascular risk in hypertensive populations. Possible mechanisms include endothelial dysfunction, oxidative stress, and activation of the renin–angiotensin system. Given the simplicity and low cost of testing for SUA and MAU, incorporating them into routine hypertension care could improve early detection of high-risk patients.

CONCLUSION

Hyperuricemia is significantly associated with microalbuminuria in essential hypertension. Routine screening for both parameters is recommended to facilitate early intervention and reduce long-term renal and cardiovascular complications.

REFERENCES

1. Kearney PM, Whelton M, Reynolds K, Whelton PK, He J. Worldwide prevalence of hypertension: a systematic review. J Hypertens. 2004;22(1):11-19.
2. Gupta R. Trends in hypertension epidemiology in India. J Hum Hypertens. 2004;18(2):73-78.
3. 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. Hypertension. 2003;42(6):1206-1252.
4. Vasan RS, Beiser A, Seshadri S, Larson MG, Kannel WB, D'Agostino RB, et al. Residual lifetime risk for developing hypertension in middle-aged women and men. JAMA. 2002;287(8):1003-1010.
5. Lewington S, Clarke R, Qizilbash N, Peto R, Collins R; Prospective Studies Collaboration. Age-specific relevance of usual blood pressure to vascular mortality. Lancet. 2002;360(9349):1903-1913.
6. Jensen JS, Feldt-Rasmussen B, Borch-Johnsen K, Clausen P, Appleyard M, Jensen G. Microalbuminuria and its relation to cardiovascular disease and risk factors. Hypertension. 2000;35(4):898-903.
7. Mogensen CE. Microalbuminuria predicts clinical proteinuria and early mortality in maturity-onset diabetes. N Engl J Med. 1984;310(6):356-360.
8. Feig DI, Kang DH, Johnson RJ. Uric acid and cardiovascular risk. N Engl J Med. 2008;359(17):1811-1821.
9. Grayson PC, Kim SY, LaValley M, Choi HK. Hyperuricemia and incident hypertension: a systematic review and meta-analysis. Arthritis Care Res. 2011;63(1):102-110.
10. Kuwabara M, Niwa K, Hisatome I, Nakagawa T, Roncal-Jimenez CA, Andres-Hernando A, et al. Asymptomatic hyperuricemia without comorbidities predicts cardiometabolic diseases: five-year Japanese cohort study. Hypertension. 2017;69(6):1036-1044.