Section: General Medicine

Original Research Article

# GENDER COMPARISON IN PREHYPERTENSIVE PATIENTS FOR URIC ACID AND MICROALBUMINURIA

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## ABSTRACT

**Background:** The aim and objective is to study the relationship between serum uric acid and microalbuminuria among prehypertensive adults and to assess the gender differences in their prevalence and correlation. **Materials and Methods:** This analytical cross-sectional study was conducted at the Outpatient Department of Sri Venkateshwaraa Medical College Hospital and Research Centre, Ariyur, Puducherry, over 19 months (March 2024–October 2025). A total of 100 prehypertensive adults (47 males and 53 females) aged 20–45 years were enrolled. Prehypertension was defined according to the JNC 7 criteria (systolic BP 120–139 mmHg and/or diastolic BP 80–89 mmHg). Subjects with hypertension, diabetes mellitus, cardiovascular or cerebrovascular disease, urinary tract infection, febrile illness, metabolic syndrome, or on ACE inhibitors were excluded. Serum uric acid and urinary albumin–creatinine ratio (ACR) were measured, and microalbuminuria was defined as an ACR of 30–300 mg/g. The association between hyperuricemia and microalbuminuria was analyzed separately for both genders using Pearson's Chi-square test, and odds ratios were calculated. **Result:** Among 100 subjects, 47% were males and 53% females. Microalbuminuria was observed in 20 males (42.5%) and 17 females (32.0%). Hyperuricemia was seen in 19 males (40.4%) and 19 females (35.8%). The prevalence of hyperuricemia among those with microalbuminuria was significantly higher in both males (60%) and females (58.8%) compared to those with normoalbuminuria, which was 25.9% and 25%, respectively, with an odds ratio of 4.29 ($p < 0.05$). **Conclusion:** A significant association is seen between hyperuricemia and microalbuminuria in prehypertensive individuals of both genders, suggesting that uric acid could serve as a potential marker for early vascular dysfunction. Screening for uric acid and microalbuminuria in prehypertensive patients helps in identifying individuals at high cardiovascular risk.

## INTRODUCTION

Prehypertension, as defined by the Joint National Committee (JNC 7), represents systolic blood pressure between 120–139 mmHg and/or diastolic pressure between 80–89 mmHg. Individuals within this category are predisposed to develop sustained hypertension and related end-organ damage. Recognizing biochemical markers associated with early vascular injury in this group is vital for preventive intervention.[1-3]

Serum uric acid has emerged as a potential indicator of cardiovascular and renal dysfunction. Hyperuricemia contributes to oxidative stress, endothelial dysfunction, and activation of the renin–angiotensin system, all of which promote vascular injury. Similarly, microalbuminuria, representing low-grade albumin excretion in urine, reflects early glomerular and endothelial damage and correlates with cardiovascular morbidity even in normotensive individuals.[4-6]

Gender-based variations in uric acid metabolism and renal function have been documented, with males generally showing higher serum uric acid levels due to hormonal and metabolic differences. However, the correlation between uric acid and microalbuminuria among prehypertensive males and females remains insufficiently explored in the Indian population.[7-10]

This study aims to assess the relationship between uric acid and microalbuminuria in prehypertensive subjects and to determine whether gender differences influence this association.

**Aims and objectives of the study**

1. To study the relationship between uric acid and microalbuminuria in prehypertensive adults.


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2. To study the prevalence of hyperuricaemia with microalbuminuria in prehypertensive adults.

## MATERIALS AND METHODS

**Setting:** OPD in Sri Venkateshwaraa Medical College Hospital and Research Centre, Ariyur, Puducherry.
**Design of Study:** Analytical cross-sectional study
**Period of Study:** 19 months (March 2024-October 2025)
**Sample size:** One hundred prehypertensive subjects (both newly and previously diagnosed) attending the outpatient clinic were included in this analytical cross-sectional study.
**Inclusion criteria:**

1. Prehypertensive subjects (both newly and previously diagnosed) attending the outpatient clinic.
2. This study group included males and females in the age group of 20-45years.

**Exclusion criteria:**

1. Hypertension (defined by JNC 7 criteria)
2. Diabetes Mellitus
3. History of Cardiovascular disease or cerebrovascular accidents
4. Microalbuminuria detected by dipstick (trace-3+)
5. Febrile patients
6. Patients with UTI
7. Patients on ACE inhibitors
8. Metabolic syndrome based on IDF (International Diabetes Foundation) criteria.

## RESULTS

**Table 1: Sex Distribution Among Prehypertensives**

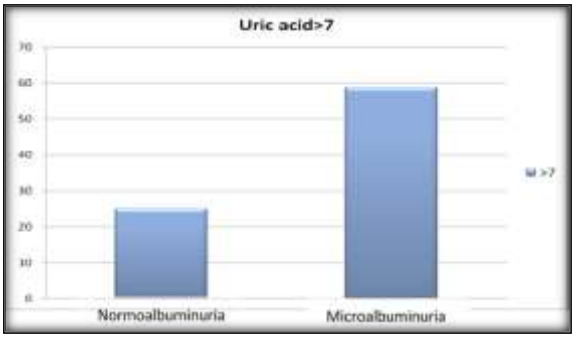
| Sex | Percent |
|---|---|
| Male | 47% |
| Female | 53% |

Among the total of 100 cases studied,47% were males and 53% were females.

**Table 2: Microalbuminuria and uric acid-males**

| | | | <= 7.00 | <7 | |
|---|---|---|---|---|---|
| ACR | Normoal buminuria | Count | 20 | 7 | 27 |
| | | Percent | 74.1% | 25.9% | 100.0% |
| | Microalbuminuria | Count | 8 | 12 | 20 |
| | | Percent | 40.0% | 60.0% | 100.0% |
| Total | | Count | 28 | 19 | 47 |
| | | Percent | 59.6% | 40.4% | 100.0% |

**Hyperuricaemia in prehypertensives with microalbuminuria-males:** Of the total 47 prehypertensive subjects(males) studied, 20 had microalbuminuria and 27 had normoalbuminuria.
Of the total 47 prehypertensive subjects(males) studied, 40.4% had hyperuricaemia.
Prevalence of hyperuricaemia in subjects with normoalbuminuria:
Of the 27 prehypertensive subjects(males) with normoalbuminuria, 25.9% had hyperuricaemia.
Prevalence of hyperuricaemia in subjects with microalbuminuria.
Of the 20 prehypertensive subjects (males) with microalbuminuria, 60% had hyperuricaemia.



**Microalbuminuria and Uric Acid-Males**

**Table 3: Relation of hyperuricaemia with microalbuminuria in prehypertensive subjects: Odd Ratio: 4.29**

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | a5.539 | 1 | .019 |

Pearson's Chi-square test shows that the asymptotic significance value is 0.019. So, the association between hyperuricaemia with an (odd ratio 4.29) with microalbuminuria in prehypertension (males) is significant.

**HYPERURICAEMIA IN PREHYPERTENSIVES WITH MICROALBUMINURIA-FEMALES:**

| | | | Uric Acid | | Total |
|---|---|---|---|---|---|
| | | | <=6.00 | >6 | |
| ACR | Normoalbuminuria | Count | 27 | 9 | 36 |
| | | Percent | 75.0% | 25.0% | 100.0% |
| | Microalbuminuria | Count | 7 | 10 | 17 |
| | | Percent | 41.2% | 58.8% | 100.0% |
| Total | | Count | 34 | 19 | 53 |
| | | Percent | 64.2% | 35.8% | 100.0% |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Odd Ratio: 4.29

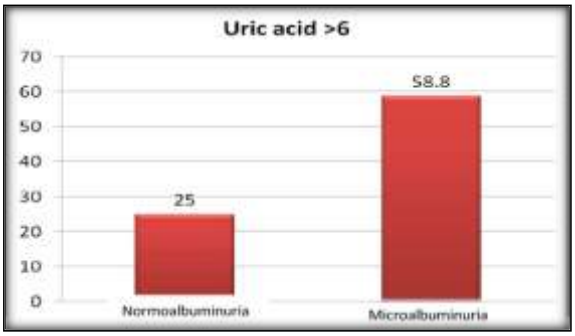
Of the total 53 prehypertensive subjects(females) studied,36 had normoalbuminuria and 17 had microalbuminuria.

Of the total 53 prehypertensive subjects(females) studied,35.8% had hyperuricemia.

Prevalence of hyperuricemia in subjects with normoalbuminuria:

Of the total 36 prehypertensive subjects (females) with normoalbuminuria,25% had hyperuricaemia.

**Microalbuminuria and uric acid-females:**




Prevalence of hyperuricaemia in subjects with microalbuminuria: Of the total 17 prehypertensive subjects (females) with microalbuminuria, 58.8% had hyperuricaemia. Odd Ratio: 4.29.

**Relation of hyperuricaemia with microalbuminuria in prehypertensive subjects:**

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | a5.744 | 1 | .017 |

Pearson's Chi-square test shows that the asymptotic significance value is 0.017. So, the association between hyperuricaemia with an Odds ratio of 4.29 with microalbuminuria in prehypertension (males) is significant.

## DISCUSSION

This study has shown a significant association between serum uric acid and microalbuminuria among prehypertensive adults of both genders. Hyperuricemia was more common in subjects with microalbuminuria than in those with normoalbuminuria, with an odds ratio of 4.29 and statistically significant p-values (<0.05).These findings are consistent with previous studies that have demonstrated that high uric acid levels correlate with microalbuminuria and early vascular dysfunction in prehypertensive individuals, as documented by Lee et al. (2006) and Perlstein et al. (2004). The endothelial injury caused by uric acid might be mediated by oxidative stress, inflammation, and impairment of nitric oxide synthesis, thus contributing to renal and vascular damage in prehypertensive subjects even before the development of hypertension.Despite the fact that uric acid is generally higher in males, probably due to hormonal influences, a similar pattern of correlation was noted in both sexes, suggesting that the association between uric acid and microalbuminuria is gender-independent. Routine screening of prehypertensive patients for serum uric acid and microalbuminuria may be beneficial in identifying subjects at increased cardiovascular risk and may enable early lifestyle or therapeutic intervention.

## CONCLUSION

In this study, out of 27 prehypertensive subjects (males) with normoalbuminuria,25.9% had hyperuricemia, and out of 20 prehypertensive subjects(males) with microalbuminuria,60% had hyperuricemia. (Odds ratio 4.29) Of the total 36 prehypertensive subjects (females) with normoalbuminuria, 25%(9) had hyperuricaemia. Of the total 17 prehypertensive subjects(females) with microalbuminuria, 58.8% had hyperuricaemia. (Odds ratio 4.29)

In both male and female prehypertensive subjects, those with Microalbuminuria had higher uric acid levels than those with normoalbuminuria, and this relation was statistically significant. (men p value-0.019, women p value-0.017, odds ratio 4.29).

This study demonstrates a strong independent association between uric acid level and microalbuminuria in prehypertensive subjects without a history of cardiovascular disease or decreased renal function. It is well known that microalbuminuria is associated with an increased risk for cardiovascular disease and might be an easily detectable marker for generalized vascular dysfunction. Although we are unable to determine whether serum uric acid has a causative role in hypertension or prehypertension, the study findings suggest that serum uric acid level can be a strong predictor of cardiovascular disease when combined with elevated blood pressure (even mildly elevated). Endothelial dysfunction may be a possible pathway linking uric acid and cardiovascular disease.

Several studies have demonstrated that subjects with prehypertension are at increased cardiovascular risk and may already have evidence of end-organ damage, such as impaired ventricular relaxation or microalbuminuria. However, there is no data to prove that pharmacological therapy in prehypertension improves outcomes. Drug therapy in >30% of the adult population would be prohibitively expensive and could cause side effects that would counteract any beneficial effects associated with the reduction in blood pressure. The Joint National Committee-7 report recommends antihypertensive drugs for patients with diabetes or chronic kidney disease as high-risk patients. Our observational data implies that prehypertensive subjects with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hyperuricemia may also be a high-risk group that could benefit from lowering blood pressure by both lifestyle modifications and pharmacological methods.

## REFERENCES


1. Bunevicius A., Smith T., Laws E.R. 2016. "Low Tri-Iodothyronine Syndrome in Neurosurgical Patients: A Systematic Review of Literature." World Neurosurgery, 95, 197–207.
2. Lee J.E., Kim Y.G., Choi Y.H., Huh W., Kim D.J., Oh H.Y. 2006. "Serum Uric Acid Is Associated with Microalbuminuria in Prehypertensive Subjects." Hypertension, 47(5), 962–967.
3. Mazzali M., Hughes J., Kim Y.G., Jefferson J.A., Kang D.H., Gordon K.L., Lan H.Y., Kivlighn S.D., Johnson R.J. 2001. "Elevated Uric Acid Increases Blood Pressure in the Rat by a Novel Crystal-Independent Mechanism." Hypertension, 38(5), 1101–1106.
4. Feig D.I., Kang D.H., Johnson R.J. 2008. "Uric Acid and Cardiovascular Risk." New England Journal of Medicine, 359(17), 1811–1821.
5. Johnson R.J., Nakagawa T., Jalal D., Sánchez-Lozada L.G., Kang D.H., Ritz E. 2013. "Uric Acid and Chronic Kidney Disease: Which Is Chasing Which?" Nephrology Dialysis Transplantation, 28(9), 2221–2228.
6. Tuttle K.R., Short R.A. 2009. "Longitudinal Relationships Among Urine Protein, Serum Uric Acid, and Kidney Function." Clinical Journal of the American Society of Nephrology, 4(6), 1056–1062.
7. Perlstein T.S., Gumieniak O., Hopkins P.N., Murphey L.J., Brown N.J., Williams G.H., Hollenberg N.K., Fisher N.D.L. 2004. "Uric Acid and the State of Prehypertension." Hypertension, 44(6), 817–822.
8. Fang J., Alderman M.H. 2000. "Serum Uric Acid and Cardiovascular Mortality: The NHANES I Epidemiologic Follow-up Study, 1971–1992." Journal of the American Medical Association (JAMA), 283(18), 2404–2410.
9. Jalal D.I., Rivard C.J., Johnson R.J. 2010. "Chronic Hyperuricemia Causes Endothelial Dysfunction." American Journal of Physiology-Renal Physiology, 299(5), F1105–F1111.
10. Feig D.I. 2014. "Uric Acid and Hypertension." Seminars in Nephrology, 31(5), 441–446.




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