ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 9 | September - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY ON SERUM URIC ACID LEVELS AS A SCREENING TOOL TO Dx TARGET ORGAN DAMAGE IN ESSENTIAL HYPERTENSION

General Medicine

Dr. Thumu Venkata Ramana Reddy MD, Assistant Professor, 37-1-412, B-209, B K Enchanting Enclave, Beside D Mart, Trunk Road, Ongole, Prakasam Dist. A. P. PIN-523001

Dr. Keshavkumar Majjari* MD, Assistant Professor, Staff Qurters, no:401, Mamata Academy Of Medical Sciences, Bachupally, Hyderabad-90 *Corresponding Author

Dr. Reddy Jayaprakash Reddy MD, Professor & HOD, No:473, APR Pranav Antilia, Bachupally, Hyderabad-500090.

ABSTRACT

Hypertension is considered as the first major risk factor for cardiovascular diseases all over the world. It increases mortality through target organ damage like Heart, Kidney & Brain too. Raised Serum Uric acid levels also increases the risk for cardiovascular diseases which is more in hypertension & metabolic diseases. **Aim of the study:** To study the relationship between serum uric acid and target organ damage (left ventricular hypertrophy and Microalbuminuria) in untreated/irregularly treated patients with Hypertension in a tertiary care hospital, Telangana. **Materials and methods:** A Cross-sectional study was done on 110 cases for a period of 6 months i.e. from June 2019 to December 2019 in the Department of General Medicine at Mamata Academy of Medical Sciences, Hyderabad, Telangana. Cases were selected randomly and divided them into 2 groups. Group I: Comprised Hypertensive cases with BP ≥ 140/90 mm hg and Group II: Comprised of cases with BP ≤ 120/80 mm hg. **Results:** Majority of cases were among (59%) 56-65 years age group. Males (68.1 %) were predominant as compared to females(31.8%) . 90 (81.8%) cases had shown elevation of serum uric acid in hypertensive cases and 30(27.27%) controls had shown the elevation of uric acid. Microalbuminuria was present in 77.2% of the hypertensive cases & 15(33.69%) in control group too.76 (69%) hypertensive cases show 2D Echo changes of left ventricular hypertrophy. **Conclusion:** Present study concludes that raised serum uric acid levels in elderly patients can be a reliable marker for assessment of target organ damage with history of hypertension

KEYWORDS

Serum Uric acid, Hypertension , Microalbuminuria

INTRODUCTION

Hypertension (HTN) is the leading cause of preventable death and disability worldwide and is a major global risk factor for cardiovascular diseases [(1)]. It has an estimated prevalence of 30–45% in the general population, resulting in an increased burden of cardiovascular diseases, nephropathy and cerebrovascular damage, often with devastating consequences [(1)]. HTN is responsible for at least 45% of deaths due to cardiac diseases, 51% of deaths due to stroke, and an estimated 16.5% (9.4 million) of all deaths annually [(2)].

In evaluating a patient with hypertension, it is recommended that target organ damage (TOD) be identified in order to better define the individual's global cardio-vascular risk in an effort to guide the decision to begin treatment is to determine target BP levels.

Target organ damage (TOD) is defined by the presence of Microalbuminuria (urinary albumin excretion: 20–200 mg/L) or echocardiographic evidence of LV hypertrophy (LVH) defined as LVMI ≥134 g/m^2 in men and ≥110 g/m^2 in women. In less developed parts of the world, the diagnosis of hypertension is often delayed, as a result, TOD may be present at the time of diagnosis. Uric acid (UA) levels tend to be elevated in patients with hypertension. Elevated UA is a risk factor for the development of cardiovascular disease, and the ESH-EC guidelines recommend performing routine laboratory testing for serum UA (SUA) in patients with hypertension. While it has been shown that SUA is associated with multiple cardiovascular risk factors, including hypertension, metabolic syndrome, diabetes, and renal disease, it remains to be known if UA independently predicts adverse cardiovascular events in patients with hypertension.

According to VIII JNC criteria, HTN is defined as consistent systolic blood pressure (SBP) greater than or equal to 140 mmHg and diastolic blood pressure (DBP) greater than or equal to 90 mmHg [(3)] . The risk of vascular complications linearly increases with higher BP values [(4)].Approximately 90% of patients with HTN have elevated BP with no known reason and are termed having essential hypertension (EH) [(5)] and is typically after ruling out other causes of HTN (secondary hypertension) includes Cushing syndrome, Reno arterial stenosis, primary hyperaldosteronism, and pheochromocytoma [(6)].

The increasing frequency of hyperuricemia and gout are most likely caused by westernized lifestyle and environment [7] .In women, especially, the disease risk increases at even lower serum uric acid levels compared to men. The serum uric acid level is known to vary significantly depending on meals, lifestyle, gender, and previous use of diuretics [8]. Recent cross-sectional, cohort, and interventional studies have identified hyperuricemia as an independent risk factor for hypertension [9, 10, 11] and 25% to 50% of hypertensive individuals are hyperuricemic. Hyperuricemia also confers increased risk for cardiovascular mortality, especially in women [11,12].

Identifying patients with subclinical TOD provides the best opportunity for preventing progression to overt cardiovascular disease, therefore identification of a relatively inexpensive risk marker, like UA, may help to identify patients who are at higher risk, thereby directing further evaluation.

Aim of the study: This study was thus aimed at investigating the relation-ship between SUA and TOD in newly diagnosed, long standing, untreated patients with essential hypertension.

Materials and Methods

- Written informed consent was obtained from the all the cases included in the study.
- **Sample size**: 220 among which 110 are HTN patients and 110 are control group.
- **Type of study :** Cross-sectional study
- **Duration of study:** Period of 6 months i.e. from June 2019 to December 2019.
- **Place of study:** In the department of General Medicine at Mamata Academy of Medical sciences, Hyderabad, Telangana.
- Hypertension is defined according to the JNC VIII guidelines.
- Cases were selected randomly and divided them into 2 groups . Group I: comprised of 110 hypertensive cases with BP ≥ 140/90 mm hg and Group II: comprised of 110 normotensive cases with BP ≤ 120/80 mm hg.
- The investigations done included are such as CBP, CUE, FBS, RFT, FLP, SUA
- **Microalbuminuria:** Microalbuminuria was defined as an albumin concentration between 20–200 mg/L. All patients were

subjected to a spot urine micro albumin test using the radio immunoassay kit.
- **Echocardiogram:** Echocardiograms were obtained at rest with patient in supine left lateral position, using standard parasternal and apical views.

Inclusion criteria:
- Patients who are willing to participate in the study.
- Age: 35 years to 65 years.
- Both gender.
- Patients with BP ≥ 140/90mm hg.

Exclusion Criteria:
- Diabetes mellitus & any other pre-existing disease.
- Patients with Pre Hypertension BP ≤ 130/89 mm Hg > 120/80 mm Hg.

RESULTS
- Total 220 cases were included in the present study.
- The main findings in the present study are raised serum uric acid levels and are more prevalent among hypertensive individuals than the normotensive controls, raised serum uric acid in the patients with hypertension was accompanied by micro albuminuria and increased left ventricular hypertrophy.

Table 1: Age distribution:

Age in years	Hypertensive Group		Control Group	
	No. of cases	%	No. of cases	%
35 – 45 years	20	18.1	25	22.7
46 – 55 years	25	22.7	50	45.4
56 – 65 years	65	59.0	35	31.8
Total	110	99.8%	110	99.9%

- In the present study the age distribution was 35-65 years. Majority of cases were among 56-65 years age group i.e. 59% (65/110), followed by 46-55 years 22.7% (25/110) 18.1 % are 35-45 years.

Table 2: Sex distribution:

Sex	Hypertensive group		Control group	
	No. of cases	%	No. of cases	%
Males	75	68.1	50	45.45
Females	35	31.8	60	54.54
Total	110	99.9	110	99.9

- In the present study 68.1 % (75/110) of males and 31.8 % (35/110) of females were involved in Hypertensive group which has male prevalence.

Table 3: Personal Habits

Groups	PERSONAL HABITS						
	Only Smoking		Only alcohol		Smoking + alcohol	Absent	Total
	No. of cases	%	No. of cases	%	No. of cases	No. of cases	
Hypertensive	30	27.2	25	22.7	50 (45.5)	05(4.5%)	110
Control	15	13.6	10	9.09	10(9.09)	75(68%)	110

- In the present study 45.5 % have shown history of both smoking & alcohol.
- 27.2 % cases and 13.6% control have history of smoking.
- 22.7 % cases and 9.09% controls have history of alcohol.

Table 4: Raised Serum uric acid distribution

Group	Hyperuricemia				Total
	Present		Absent		
	No. of cases	%	No. of cases	%	
Hypertensive	90	81.8	20	18.1	110
Control	30	27.27	80	72.7	110

- 81.8% (90/110) cases had shown elevation of serum uric acid, and only 27.27% controls had shown the elevation of uric acid.

Table 5: Microalbuminuria prevalence

Group	Microalbuminuria				Total
	Present		Absent		
	No. of cases	%	No. of cases	%	
Hypertensive	85	77.2%	25	22.7	110
Control	15	13.63%	95	87.3	110

- In the present study Microalbuminuria was present in 77.2% of the hypertensive case where as only 13.6% in Controls.

Table 6: 2D ECHO changes of left ventricular hypertrophy

Group	2D ECHO changes - left ventricular hypertrophy				Total
	Present		Absent		
	No. of cases	%	No. of cases	%	
Hypertensive	76	69	34	31	110
Control	22	20	88	80	110

In the present study 69% cases show 2D ECHO changes of left ventricular hypertrophy and 20% of controls also Show LVH in 2D ECHO. There was a significant positive correlation between SUA level and the number of target organs involved. This suggests that the number of TOD increased with increasing levels of SUA.

DISCUSSION
Our study includes a total of 220 number were included among which 110 are patients and 110 are control group. Our study includes 68.1 % (75/110) of males and 31.8 % (35/110) of females in Hypertensive group where male prominence is noted. **In Sandra N Ofori et al study** [14] female-to-male ratio was 1.9:1.In CT Sioufis **et al study** [15] 48.3% males which is quite contrast with our study. Even in In **Abidemi Jude Fasae et al study** [16] Fifty two (34.7%) of the 150 newly diagnosed hypertensive patients were males while 98 (65.3%) were females has Female prevalence.

In this present study age distribution was 35-65 years. Majority of cases were among **56-65 years** age group i.e. 59%(65/110), **The present study was correlating with Kumral Caglı, MD et al study** [13] where the mean age of the population was 57.3 years**, and C Tsioufis, et al study**[15] where in the pooled study population mean age was 53.4 years**,** where as in **Abidemi Jude Fasae et al study** [16] age range of 19-85 years and a mean age of 50.4±12.3 years. Whereas in Sandra **N Ofori et al study** [14] the age range was 31–70 years, with a mean age of 46.8±9.3 years.

This study included 45.5% (50) patients with history of either smoking or alcohol.27.2 % (30) cases have history of smoking and 22.7 % (25)cases have history of alcohol. Where as in **C Tsioufis, et al study** [15] 31.1% of the participants were smokers which is more than this study.

In this study 81.8% (90/110) cases had shown elevation of serum uric acid, and 27.27% (30) controls had shown the elevation of uric acid. Whereas in **Abidemi Jude Fasae et al study** [16] the prevalence of Hyperuricemia was 36.7% and 17.4% in hypertensive patients and normotensive controls respectively. **C Tsioufis et al study** [15] mean duration of hypertension was 5.5 years.

LVH in 2D Echo is seen in 69% (76) cases and 20% (22) controls in our study. **In Sandra N Ofori et al study** [14] LVH was present in 55.4% of the cases10.8% of the controls which is lesser than the present study. **In Abidemi Jude Fasae et al study** [16] among the hypertensive patients only 28.7% had LVH which lesser than our study.

In the present study Microalbuminuria was present in 77.2% (85) of the hypertensive cases 13.63% (15) in controls whereas in **Sandra N Ofori et al study** [14].The prevalence of Microalbuminuria among the cases was 37.7%, while it was 7.7% in the controls which is far lesser than our study.

Overall, 69% of the cases had at least one TOD, and females were more affected than males which is almost similar with other studies. Hyperuricemia and Microalbuminuria prevalence numbers are in directly proportionate with LVH which is a clue to diagnose Target organ damage .TOD is directly proportionate with long standing and ill-treated hypertension and can be assessed by the Serum uric acid levels.

CONCLUSION
Present study concludes that hyperuricemia is an independent risk factor for hypertension and indirectly to the target organ damage. Serum Uric acid is the most economical, easily available and feasible investigation to evaluate target organ damage in Hypertension patients. Hence it can be considered as reliable marker to identify cardiovascular damage in Hypertension patients. In conclusion, it is

the opinion of the authors that in clinical practice Serum Uric acid should be done in all patients presenting with hypertension as a screening test in order to identify those who are at higher cardiovascular risk and who thus warrant more intensive investigations and intervention.

Disclosures:

The authors report no conflicts of interest in this work.

REFERENCES

1. Schmieder RE. End organ damage in hypertension. Deutsches Arzteblatt international 2010; 107:866-73.
2. WHO. A global brief on hypertension. World Health Organization, 2013.
3. Whelton PK, Carey RM, Aronow WS,et.al.2017 ACC/AHA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/ American Heart Association Task Force on Clinical Practice Guidelines. J Am Coll Cardiol 2017. [Epub ahead of print].
4. Malyszko J, Muntner P, Rysz J, et al. Blood pressure levels and stroke: J-curve phenomenon? Curr Hypertens Rep 2013;15:575-81.
5. Kossaify A, Garcia A, Succar S, et al. Perspectives on the value of biomarkers in acute cardiac care and implications for strategic management. Biomark Insights 2013;8:115-26.
6. Faselis C, Doumas M, Papademetriou V. Common secondary causes of resistant hypertension and rational for treatment. Int J Hypertens 2011;2011:236239.
7. Guideline Revision Committee, JSNM: Guideline for the Management of Hyperuricemia and Gout, ed Medical Review, 2010. 2 Gavin AR,
8. Tokyo, Struthers AD: Hyperuricemia and adverse outcomes in cardiovascular disease: potential for therapeutic intervention. Am J Cardiovasc Drugs 2003;3:309–314
9. Kuwabara M, Niwa K, Nishi Y, et al: Relationship between serum uric acid levels and hypertension among Japanese individuals not treated for hyperuricemia and hypertension. Hypertens Res 2014;37:785–789.
10. Kuwabara M, Niwa K, Nishi Y, Hisatome I, et al: The positive relationship between uric acid and hypertension in Japanese people not taking antihypertensive drugs. J Hypertens 2011;29:e32–e33.
11. Cannon PJ, Stason WB, Demartini FE, Sommers SC, Laragh JH. Hyperuricemia in primary and renal hypertension. N Engl. J. Med. 1966; 275:457 – 464.
12. Alderman MH, Cohen H, Madhavan S, Kivlighn S. Serum uric acid and cardiovascular events in successfully treated hypertensive patients. Hypertension. 1999; 34: 144 – 150
13. Kumral Caglı, MD; 1 Osman Turak, MD Et al Association of Serum Uric Acid Level With Blood Pressure Variability in Newly Diagnosed Essential Hypertension the Journal of Clinical Hypertension Vol 17 | No 12 | December 2015.
14. Sandra N Ofori Osaretin J Odia original Research Serum uric acid and target organ damage in essential hypertension Vascular Health and Risk Management 2014:10
15. C Tsioufis, D Chatzis, E Vezali, K Dimitriadis Et al Department of Cardiology, Athens University, Hippokration Hospital, Athens, Greece, Original article The controversial role of serum uric acid in essential hypertension & relationships with indices of target organ damage Journal of Human Hypertension (2005) 19, 211–217.
16. Abidemi Jude Fasae1 , Olusegun Adesola Busari1, Rotimi Oluyombo1 Et al, Hyperuricemia and Its Correlation with Target Organ Damage and Electrocardiographic Changes in Newly Diagnosed Adult Nigerian Hypertensive Patients Clinical Medicine Research 2018; 7(1): 1-7
17. Badrinath, A. K., Suresh, K & H. (2016). The Study of Uric Acid Levels in Primary Hypertension without End Organ Damage. Journal of Advances in Medicine and Medical Research, 18(8), 1-11.