e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(5); 1337-1342

Original Research Article

Microalbuminuria in Subjects with Essential Hypertension: A Clinical Study of Its Association with Stage, Duration of Hypertension and Treatment Compliance

Asiya Zeba[1], CH Monica Lakshmi Priyanka[2], Shivaraj S. Hanchinal[3], Mamatarani[4]

[1,2,3,4]Assistant Professor, Dept. of General Medicine, ESIC MC and PGIMSR Kalaburagi

Received: 01-03-2025 / Revised: 20-05-2025 / Accepted: 25-05-2025

Corresponding author: Dr. Mamatarani

Conflict of interest: Nil

Abstract

Background: Hypertension is a major public health problem all over the world. Microalbuminuria is frequently seen secondary to renal involvement in these hypertensives. Microalbuminuria has a major impact on cardiovascular risk and has thus become a prognostic marker for cardiovascular disorders. It is also a good screening test for early detection of renal disease and may be a marker for the presence of microvascular disease in general. Moreover, microalbuminuria is reversible. Thus, early detection and treatment of such patients with drugs like ACE inhibitors has been shown to be useful in retarding progress of nephropathy and target organ damage.

Methodology: In our study, 100 patients who were diagnosed with essential hypertension were selected from outpatient clinic and wards of a tertiary care teaching hospital over a period of 2 years after applying both inclusion and exclusion criteria. Microalbuminuria was measured in these patients by immunoturbidometric method.

Results: In this study 54 patients were males and 46 patients were females out of 100 hypertensives. Prevalence of microalbuminuria was 33%. Distribution of microalbuminuria in different sex- 35.2% males and 30.43% females had microalbuminuria. 17.65% of patients were in 40-49 years age group, 40% in 50-59 years, 35.8% in 60-69 years, 43.8% in 70-79 years and 100% in 80 years and above. Out of 100 patients, 14% were newly diagnosed hypertensives while 58% were hypertensives for a period of ≤5 years. 18% patients had hypertension for 6-9 years and 10% for≥10 years. Chi-Square=12.4577, P=0.005969. Microalbuminuria was present in 4 patients with newly detected hypertension, 14 patients with hypertension ≤5 years, 7 patients with 6-9 years of hypertension and 8 patients with ≥10 years of hypertension. This is statistically significant. In Current study, 23 hypertensive patients were not on any treatment, 32 were on irregular treatment, 45 on regular treatment. Microalbuminuria was present in 6 out of 23 patients who are not on any treatment, 21 out of 32 who were on irregular treatment and 6 out of 45 who were on regular treatment. This is statistically significant. 34% of stage 1 hypertension and 31% of stage 2 hypertension had microalbuminuria.

Conclusion: Microalbuminuria has a positive correlation with duration of hypertension and treatment compliance which emphasizes the importance of effective blood pressure control. Early detection of microalbuminuria enables us to initiate appropriate management, with drugs like ACE inhibitors, to prevent further organ damage and reduce mortality and morbidity.

Keywords: Hypertension; Microalbuminuria; Target Organ Damage; ACE inhibitors.

Introduction

Hypertension is a major public health problem all over the world. Hypertension can lead to end organ damage which manifests as coronary heart disease/structural heart disease, stroke, end-stage renal disease, retinopathy, peripheral vascular disease and congestive heart failure.

Hypertension is one of the most important modifiable risk factors. Thus, health care professionals should identify, treat patients with hypertension and also promote a healthy lifestyle and preventive strategies to decrease the prevalence of hypertension in the general population. [1,2] Once the End Organ Damage (EOD) sets in, the cost is greater, efficacy and prognosis are lower, for the management of blood pressure. [3]

Hence, in patients with hypertension, the early detection and treatment of EOD not only determine the cardiovascular prognosis but can also retard or prevent further damage. [4] A large body of evidence has suggested that microalbuminuria in

hypertensives is a predictor of organ damage and cardiovascular events. [5] Microalbuminuria is frequently seen secondary to renal involvement in these hypertensives. Essential hypertension produces clinical proteinuria and a significant reduction in renal function in 5 – 15% of patients. The prevalence of microalbuminuria varies enormously among different studies, with rates ranging between 5% and 37%. Microalbuminuria has a major impact on cardiovascular risk. [6] During the past few year's microalbuminuria has become a prognostic marker for cardiovascular disorders. It is also a good screening test for early detection of renal disease and may be a marker for the presence of microvascular disease in general. [7] Hence in this study we wanted to determine the presence of microalbuminuria in essential hypertensive subjects and co-relate the results with stage, duration of hypertension and compliance to treatment.

Objectives

1. To study the prevalence of microalbuminuria in essential hypertensive subjects.
2. To study the association of microalbuminuria with stage, duration and control of hypertension.

Materials and Methods

This study was conducted in the Department of General Medicine. 100 patients who match the inclusion and exclusion criteria have been selected by random sampling method and included in the study. Data was collected using the pretested proforma. Patients who were diagnosed with essential hypertension (already known or newly diagnosed), selected from outpatient clinic and wards of tertiary care teaching hospital after applying inclusion and exclusion criteria.

Inclusion Criteria

1. Adults aged more than 40 years attending medical OPD and wards, diagnosed to have essential hypertension.
2. Patients diagnosed with essential hypertension and already on antihypertensive drugs.
3. As per JNC VII criteria, BP above 140/90mmHg is regarded as hypertension.

Exclusion Criteria

1. Proven cases of secondary hypertension
2. Diabetes Mellitus
3. Urinary tract infection
4. Established cases of kidney diseases
5. Macroproteinuria
6. Congestive cardiac failure
7. Pregnancy
8. Acute febrile illness

Method of collection

1. For patients already diagnosed with hypertension and on antihypertensive treatment, diagnosis of hypertension was verified with previous records.
2. For newly detected hypertensives, diagnosis of hypertension was made based on BP recorded in the right arm by mercury sphygmomanometer. For each patient two readings were recorded. BP was measured with patient's back supported and relaxed for five minutes and right arm was kept at the heart level.

Following Investigations were done in all patients:

- RBS, FBS, PPBS, HBA1C
- RFT, CBC
- Urine routine and microscopy
- Chest X-ray- for cardiomegaly
- Ultrasound abdomen- to look for renal system abnormalities
- ECG

Test for microalbuminuria

- Patients were told to avoid exercise prior to collection of urine sample.
- 5ml of early morning sample of first void mid-stream urine was collected.
- The urine samples were tested for microalbuminuria by immunoturbidimetric method.
- Principle- Turbidimetry measures the reduction in light transmission caused by particle formation, and it quantifies the residual light transmitted.
- Method- TURBILYTE-MA kit by Coral clinical systems, Goa was used to perform the test on semi-auto analyser. This is based on the principle of agglutination reaction. The test specimen is mixed with the activation buffer and the antihuman antibody solution and allowed to react. Presence of albumin in the test specimen forms an insoluble complex producing a turbidity, which is measured at wavelength 340nm. The resulting turbidity corresponds to the concentration of the albumin in the test specimen.
- Urine albumin values between 20mg/l and 300mg/l were considered as micro-albuminuria.

Statistical Method: Relationship between microalbuminuria and other variables was studied using Chi-square test. P value was calculated for all the relevant variables.

Results

Table 1: Sex distribution

Sex	Number of patients	Microalbuminuria	Percentage
Male	54	19	35.2
Female	46	14	30.43
Total	100	33	

In Table 1, 54 patients were males and 46 patients were females out of 100 hypertensives. Distribution of microalbuminuria in different sex 35.2% males and 30.43% females had microalbuminuria.

Table 2: Age distribution

40-49	34	6	17.65
50-59	20	8	40
60-69	28	10	35.8
70-79	16	7	43.8
≥80	2	2	100
Total	100	33	

In Table 2, Age distribution, among, 100 patients studied, 34% patients belonged to 40-49 years age group, 20% to 50-59 years group, 28% between 60-69 years, 16% between 70-79 years and 2% were 80years and above. Microalbuminuria was present in 17.65% of patients in 40-49 years age group, 40% in 50-59 years age group, 35.8% in 60-69 years age group, 43.8% in 70-79 years age group and 100% in 80 years and above age group.

Table 3: Microalbuminuria and duration of hypertension

Duration of hypertension	Microalbuminuria		Total
	Absent	Present	
Newly diagnosed	10	4	14
≤5 years	44	14	58
6-9 years	11	7	18
≥10 years	2	8	10
Total	67	33	100

In table 3, Out of 100 patients, 14% were newly diagnosed hypertensives while 58% were hypertensives for a period of ≤5 years. 18% patients had hypertension for 6-9 years and 10% for≥10 years. Chi-Square=12.4577, P=0.005969. Microalbuminuria was present in 4 patients with newly detected hypertension, 14 patients with hypertension ≤5 years, 7 patients with 6-9 years of hypertension and 8 patients with ≥10 years of hypertension. This is statistically significant.

Table 4: Microalbuminuria and treatment

Treatment	Microalbuminuria		Total
	Absent	Present	
Not on treatment	17	6	23
Irregular	11	21	32
Regular	39	6	45
Total	67	33	100

Chi-Square= 23.7742, P= <0.00001

In table 4, 23 hypertensive patients were not on any treatment, 32 were on irregular treatment, 45 on regular treatment. Microalbuminuria was present in 6 out of 23 patients who are not on any treatment, 21 out of 32 who were on irregular treatment and 6 out of 45 who were on regular treatment. This is statistically significant.

Table 5: Microalbuminuria and stage of hypertension

Stage of hypertension	Microalbuminuria		Total percentage
	Absent	Present	
Normal	10	4	14
Pre-hypertension	14	7	21
Stage-1 hypertension	26	8	34
Stage-2 hypertension	17	14	31
Total	67	33	100

Chi-Square= 3.5781, P= 0.31077

In table 5, 14 known hypertensive patients recorded normal BP, 21 had pre-hypertension, 34 had stage-1 hypertension, 31 had stage-2 hypertension. 33% of patients had microalbuminuria. 4 patients with normal BP had microalbuminuria, 7 patients with pre-hypertension, 8 patients with stage-1 hypertension and 14 patients with stage-2 hypertension had microalbuminuria. This is not statistically significant.

Discussion

Hypertension is a major public health problem all over the world. The present study was done to find out the prevalence of microalbuminuria in essential hypertensive patients and it's correlation with duration, stage of hypertension and treatment compliance.

Prevalence: The prevalence of microalbuminuria in this study was 33% (33 out of 100 patients).

In 1991 Stefano Bianchi et al [8] published the first large study on the prevalence of microalbuminuria in hypertensives. It was found to be 35%. Palatini et al in-HARVEST study [9] and the PREVEND – IT showed a prevalence of 8 – 15%. Another study published by Sabharwal RK et al in 2008, prevalence was found to be 33.3% among 174 hypertensives. [10]

This is similar to my study. In a study done by AN Roopa et al in 2011- 2013, 70% of essential hypertension subjects were found to have microalbuminuria. [11] Study by Sharan badiger et al in 2012 showed prevalence of microalbuminuria to be 63%. [12] The variability in prevalence may be explained by [13] Difference in the values used to define microalbuminuria. Different protocols used to evaluate microalbuminuria. Difference in the method of urine collection. Different characteristics of study population.

Sex distribution of microalbuminuria: In this study, 35.2% males and 30.43% females had microalbuminuria. In a study by Bibek Paudel et al published in 2012, 46.7% male hypertensives and 58.7% female hypertensives were detected with microalbumin in urine. [14]

In a study by Sabharwal et al, microalbuminuria in male and female hypertensives was 34% and 30.7% respectively which is very much similar to the current study. Gopalraju Manickam Marudhaiveeran et al in their study found prevalence to be 55% in males and 45% in females. [15] In the MAGIC study on the prevalence and clinical correlates of microalbuminuria, Pontremoli et al observed that microalbuminuria was more common in males. [16]

Age distribution of microalbuminuria: There is not much difference in the prevalence of microalbuminuria among different age groups in this study. Also, in a study by HK Agarwal et al in 2018 that above 30 years of age, there is no much difference in prevalence of microalbuminuria among different age groups. [17] Gopalraju Manickam Marudhaiveeran et al also found similar results.

Duration of hypertension and microalbuminuria: In the present study, microalbuminuria was found to have significant positive correlation with duration of hypertension [P=0.005969]. Gopalraju Manickam Marudhaiveeran et al also found that as the duration of hypertension increased the prevalence of microalbuminuria also increased [P=<0.0001].

In a study by Kumar H et al in Bengaluru, there was positive correlation between duration of hypertension and microalbuminuria [P=0.007]. [18] Peter Kangwagye et al in 2018 also found similar correlation between duration of hypertension and microalbuminuria in 334 patients [0.001]. [19] Pontremoli et al 1997 in the MAGIC Study have observed that degree and prevalence of microalbuminuria correlate with the height of BP when office values were considered, which is even more so with 24 hour B P.

Microalbuminuria and stage of hypertension: In this study, microalbuminuria was present among 23.5% of stage 1 hypertensives and 45% of stage 2 hypertensives. However, the stage of hypertension and microalbuminuria had no statistical significance.

This is similar to study by Syed Umar Qadri et al published in 2013, which was studied in 60 hypertensives, where out of 30 subjects, 18 (60%) of subjects with Microalbuminuria were having stage II Hypertension as compared to 12 (40%) in subjects without Microalbuminuria. There was no statistically significant difference in Grades of hypertension & Microalbuminuria groups [p=0.071]. [20]

In study by Rita Rani Maggon et al in 2017 in 50 hypertensives, the mean diastolic blood pressure (DBP) of patients with and without microalbuminuria was similar in both groups (95.64 ± 3.6 mmHg vs. 96.8 ± 4.6 mmHg, P = 0.279). [21] S Jalal et al in 2001 also found no significant correlation between microalbuminuria and Mean Arterial Pressure.

This is in contrast to various other studies. This could be because of small sample size or technical errors or errors in BP measurement. [22]

Microalbuminuria and treatment of hypertension: In this study microalbuminuria was found to be more in subjects on irregular treatment or no treatment when compared to those on regular treatment[P=<0.00001]. Similarly, Hitha et al when studied in 150 hypertensive patients, found that microalbuminuria was present in 22.3% not on any treatment, 38% on irregular treatment. However, this was not statistically significant [P=0.07]. [23]

Conclusion

Hypertension is a major health problem in the community. Microalbuminuria has a positive correlation with duration of hypertension and treatment compliance. Prevalence of microalbuminuria is more in those with longer duration of hypertension and poor compliance to treatment, emphasizing the importance of effective blood pressure control. Hence it is important to detect microalbuminuria at early stage as it enables us to initiate appropriate management, with drugs like ACE inhibitors, to prevent further organ damage and reduce mortality and morbidity.

References

1. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al.The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: The JNC 7 Report. JAMA 2003; 289(19):2560-72.
2. M Paul Anand. Hypertension. In: Siddharth N Shah, editor. API Textbook of Medicine, 7th ed. New Delhi: Jaypee Brothers Medical Publishers; 2006. p. vol I, 531- 34.
3. Hitha B, Pappachan JM, Pillai HB, Sujathan P, Ramakrishna CD, Jayaprakash K, et al. Microalbuminuria in patients with essential hypertension and its relationship to target organ damage: An Indian experience. Saudi J Kidney Dis Transpl 2008; 19(3):411-19.
4. Mancia G, Laurent S, Agabiti-Rosei E, Ambrosioni E, Burnier M, Caulfield MJ, et al. Reappraisal of European guidelines on hypertension management: a European Society of Hypertension Task Force document. Journal of hypertension 2009; 27(11):2121-58.
5. Pedrinelli R, Dell'Omo G, Di Bello V, Pontremoli R, Mariani M. Microalbuminuria, an integrated marker of cardiovascular risk in essential hypertension. Journal of human hypertension 2002;16(2):79-89.
6. Zuccala A, Fiorenza S, Rapana R, Santoro A. Hypertension, atherosclerosis and kidney. G Ital Nefrol 2005;22(31):9-14.
7. Joanne M. Bargman, Karl Skorecki. Chronic Kidney Disease. In: Dennis L. Kasper, Stephen L. Hauser, J Larry Jameson, Anthony S Fauci, Dan L. Longo, Joseph Loscalzo, editor. Harrison's Principles of Internal Medicine, 19th ed. Mc Graw Hill education; 2015. p. 1812-13.
8. Stefano Bianchi, Roberto Bigazzi, Giorgio Baldari, Vito M. Campese, Microalbuminuria in Patients with Essential Hypertension: Effects of an Angiotensin Converting Enzyme Inhibitor and of a Calcium Channel Blocker, American Journal of Hypertension 1991;4(4):291–96.
9. Palatini P1, Graniero GR, Mormino P, Mattarei M, Sanzuol F, Cignacco GB, et al. Prevalence and clinical correlates of microalbuminuria in stage I hypertension. Results from the Hypertension and Ambulatory Recording Venetia Study (HARVEST Study). Am J Hypertens. 1996;9(4):334-41.
10. Sabharwal RK, Singh P, Arora MM, Somani BL, Ambade V. Incidence of microalbuminuria in hypertensive patients. Indian J Clin Biochem.2008;23(1):71-75.
11. Roopa AN, Reddy KSS, Chandrashekara P, Umabai KR, Madhuvan HS. Study of microalbuminuria and insulin resistance in patients with essential hypertension and metabolic syndrome and its relationship to target organ damage. J Med Sci Health 2015;1(3):5-9.
12. Sharan Badiger, Prema T. Akkasaligar, Sandeep HM, Biradar MS. Microalbuminuria in Essential Hypertension. International Journal of Medical, Health, Biomedical, Bioengineering and Pharmaceutical Engineering 2011;5(12):716-20.
13. C. Trioufis, C. Stefandis, M. Toutouza, Microalbuminuria is associated with unfavourable cardiac genetic adaptations in essential hypertensive subjects. Journal of Human Hypertension 2002; 16:249-54.
14. Poudel B, Yadav BK, Nepal AK, Jha B, Raut KB. Prevalence and Association of Microalbuminuria in Essential Hypertensive Patients. North Am J Med Sci 2012; 4:331- 35.
15. Marudhaiveeran GM, Radhakrishnan S, Alphonse F. Prevalence of microalbuminuria among patients with essential hypertension. Trop J Med Res 2014; 17:76-80.
16. Pontremoli R, Sofia A, Ravera M, Nicolella C, Viazzi F, Tirotta A, et al. Prevalence and clinical correlates of microalbuminuria in essential hypertension: the MAGIC Study. Microalbuminuria: A Genoa Investigation on Complications. Hypertension. 1997;30(5):1135-43.
17. HK Aggarwal, Deepak Jain, Sudhir Mor, RK Yadav, Promil Jain. Prevalence and Clinical Correlates of Microalbuminuria in Patients with Essential Hypertension - A Tertiary Care Center Cross Sectional Study. J Assoc

Physicians India 2018; 66:30-33.
18. Anil Kumar H, Rekha N.H, E. Dinesh Raghav. A study of microalbuminuria in patients with essential hypertension. International Journal of Contemporary Medical Research 2016; 3(5): 1468-70.
19. Peter Kangwagye, Joselyn Rwebembera, Tony Wilson, Francis Bajunirwe. Microalbuminuria and Retinopathy among Hypertensive Nondiabetic Patients at a Large Public Outpatient Clinic in Southwestern Uganda. Int J Nephrol. 2018; 2018: 4802396.
20. Syed Umar Quadri, Sunil Agrawal, Mrunalini Motlag. Association between Microalbuminuria in patients of Essential Hypertension with different parameters. International Journal of Current Medical and Applied Sciences 2013; 1:6-10.
21. Maggon RR, Malik R, Jain N, Isser HS. Study of the Prevalence of Microalbuminuria in Patients of Essential Hypertension and its Correlation with Left Ventricular Hypertrophy and Carotid Artery Intima-media Thickness. J Clin Prev Cardiol 2018; 7:11-6.
22. S Jalal, FA Sofi, MS Alai, MA Sidiqqi, MA Bhat, KA Khan, et al. Prevalence of microalbuminuria in essential hypertension: A study of patients with mild to moderate hypertension. Indian J Nephrol 2001;11: 6-11.
23. B. Hitha, J. M. Pappachan, H. Balachandran Pillai, P. Sujathan, C. D. Ramakrishna, K. Jayaprakash, et al. Microalbuminuria in Patients with Essential Hypertension and its Relationship to Target Organ Damage: An Indian Experience. Saudi J Kidney Dis Transpl 2008; 19:411-19.