

A study on prevalence of microalbuminuria and its correlates in patients with essential hypertension

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Abstract

Essential hypertension produces proteinuria and a significant reduction in renal function in 5–15% of patients. Micro-albuminuria (MA) is one of the earliest indications of kidney injury in patients with hypertension and is associated with high incidence of cardiovascular morbidity. So the present study was conducted with aim to find out the prevalence of microalbuminuria and its correlates in patients with essential hypertension. A hospital based Analytical Cross-sectional study was conducted at Medciti Institute of Medical Sciences, Hyderabad, among 100 randomly selected patients who were diagnosed with essential hypertension for a period of 6 months. The prevalence of microalbuminuria in the present study was 19%. The mean age of micro-albuminuric patients was 52.42 ± 8.78 years and in other patients was 56.74 ± 10.91 yrs and no statistically significant association was found between them. The duration of hypertension was high in microalbuminuria cases 5.47 ± 2.32 years when compared to non-microalbuminuria patients 3.52 ± 1.26 yrs. Diastolic blood pressure and cholesterol levels were found to be higher in cases of microalbuminuria when compared to normal patients and a statistically significant association was found between them. Left Ventricular Hypertrophy (LVH) was present in significant number of patients with MA as compared to those without MA (55.5% vs. 15.4%, $P < 0.05$). We recommend that early screening for microalbuminuria in patients of essential hypertension and so that early initiation of treatment might help in reducing the morbidity and mortality.

Key Word: Age, Essential hypertension, Micro-albuminuria, Left Ventricular Hypertrophy.

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Received Date: 30/01/2019 Revised Date: 26/02/2019 Accepted Date: 22/03/2019

DOI: <https://doi.org/10.26611/10211017>

Access this article online

Quick Response Code:



Website:

www.medpulse.in

Accessed Date:
09 April 2019

INTRODUCTION

Hypertension is a major public health problem worldwide. Hypertension is a disease that affects about one billion individual's worldwide.¹ The prevalence of hypertension in India according to WHO estimates in people above 18 years is around 24%.² Essential

hypertension produces proteinuria and a significant reduction in renal function in 5–15% of patients.³ Hypertension is also an independent predisposing factor for heart failure, coronary artery disease, stroke and peripheral arterial disease (PAD).⁴ Microalbuminuria (MA), defined as urinary albumin excretion (UAE) in the range of 30–300 mg/24 h, is seen in patients with established essential hypertension.⁵ Detection of increased UAE could be the best index of an increased global cardiovascular risk in a given patient.⁶ Micro-albuminuria (MA) is one of the earliest indications of kidney injury in patients with diabetes mellitus and hypertension and is associated with high incidence of cardiovascular morbidity.⁷ Micro-albuminuria possibly reflects a state of increased renal endothelial permeability and is considered an early marker of diffuse endothelial dysfunction.⁸ Micro-albuminuria is the excretion in urine of small quantities of albumin, insufficient to be demonstrated by

How to cite this article: Udai Hirdaya Mohan Lal¹, Channappa K C^{2*}, Ajay Kumar Reddy Bobba. A study on prevalence of microalbuminuria and its correlates in patients with essential hypertension. *MedPulse International Journal of Medicine*. April 2019; 10(1): 21-24. <https://www.medpulse.in/Medicine/>

ordinary laboratory methods. It has been suggested that micro-albuminuria may represent the renal manifestation of generalized, genetically conditioned vascular endothelial dysfunction.^{9,10} Although several studies have attempted to define the prevalence of microalbuminuria in essential hypertension, the exact figure is still unclear. The published prevalence of microalbuminuria in hypertensive subjects ranges from 4.7% to 58.4%.^{10,11} Since micro-albuminuria is associated with poor control of hypertension, its presence may indicate the need for improvement in control of hypertension and careful follow-up for detection of complications. This study has been undertaken with the concept of detecting micro-albuminuria, as the early marker of intra renal vascular dysfunction in essential hypertension

AIM AND OBJECTIVES

1. To find out the prevalence of microalbuminuria in essential hypertensives.
2. To find out the correlates of microalbuminuria in patients with essential hypertension.

MATERIAL AND METHODS

A hospital based Analytical Cross-sectional study was conducted at Medciti Institute of Medical Sciences, Hyderabad, among 100 randomly selected patients who were diagnosed with essential hypertension for a period of 6 months i.e., from January 2018 to June 2018. Sample size was calculated taking an estimated prevalence of 44% from previous study on Prevalence of Microalbuminuria in Patients of Essential Hypertension with 95% Confidence Interval and absolute precision of 10% the calculated sample size was 98.5 and it was rounded to 100.

INCLUSION CRITERIA

1. Age group of 30-70 years.
2. All new and old cases of hypertension (as per JNC-VII guidelines)
3. Those who give consent for the study.

EXCLUSION CRITERIA

1. Pregnant women
2. Chronic heart failure and Hepatic and renal insufficiency.
3. Patients with secondary hypertension.

Microalbuminuria is defined as urinary albumin excretion in range of 30–300 mg/24 hr, and was measured by hemocue albumin technique. From the study subjects demographic data, cardiovascular history, and other factors was collected using a semi structured questionnaire. The following measurements were then carried out on each patient: Urinary albumin and cholesterol, left ventricular hypertrophy BY 2D-echo and blood pressure measurement. Statistical Analysis: Data collected was entered in MS-Excel 2013 and was analysed using SPSS version 23 software (trial version) and p-value less than 0.05 was considered statistically significant. Chi-square test (Fischer's exact test wherever applicable) and Unpaired t-test was used to find out the significant difference between groups and p-value less than 0.05 was considered statistically significant.

RESULTS

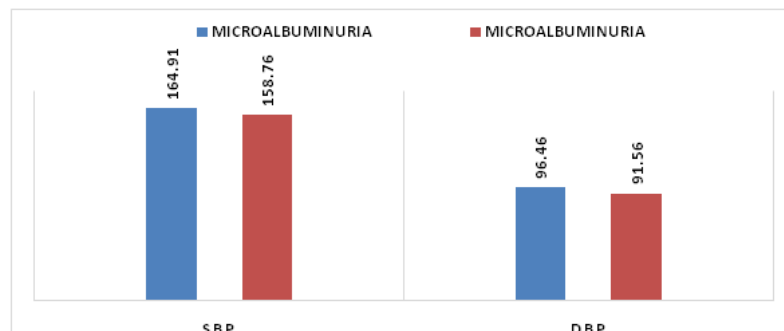
The age range of the present study was 34 to 69 years with mean age of 55.64 ± 11.76 years. Out of 100 study subjects 61 (61%) were male and 39 (39%) were female with male: female ratio of 1.56:1. The prevalence of microalbuminuria in the present study was 19%. The mean age of micro-albuminuric patients (52.42 ± 8.78) was less compared to nonmicro-albuminuric patients (56.74 ± 10.91) and no statistical significant association was found between them ($p < 0.05$) as shown in table-1. The prevalence of microalbuminuria was more in males 19.7% when compared to female 17.9% but no statistical significant association was found between them. Body Mass Index (BMI) was statistically higher ($p < 0.05$) amongst the cases having micro-albumin in their urine as shown in table-1. The duration of hypertension was high in microalbuminuria cases 5.47 ± 2.32 years when compared to non-microalbuminuria patients 3.52 ± 1.26 yrs and a statistically significant association was found between them ($p < 0.05$) as shown in table-2. Diastolic blood pressure and cholesterol levels were found to be higher in cases of microalbuminuria when compared to normal patients and a statistically significant association was found between them ($p < 0.05$). Left Ventricular Hypertrophy (LVH) was present in significant number of patients with MA as compared to those without MA (55.5% vs. 15.4%, $P < 0.05$) as shown in table-2.

Table 1: Association between socio-demographic variables and microalbuminuria

S. No	Independent variables	Microalbuminuria		P-value
		Present (19)	Absent (81)	
1.	Age	52.42 ± 8.78	56.74 ± 10.91	0.114
2.	Gender	Male (61)	12 (19.7%)	0.771
		Female (39)	54 (80.3%)	
3.	BMI	29.21 ± 3.84	26.51 ± 4.34	0.014
4.	Smoking History	YES (48)	11 (22.9%)	0.337
		NO (52)	37 (77.1%)	
			8 (15.4%)	44 (84.6%)

Table 2: Association between clinical profile and microalbuminuria

S. no	Independent variables		Microalbuminuria		P-value
			Present (19)	Absent (81)	
1.	Hypertension	Duration	5.47±2.32	3.52±1.26	0.000
		SBP	164.91 ± 12.41	158.76 ± 13.86	0.079
		DBP	96.46 ± 10.33	91.56 ± 8.89	0.038
2.	Cholesterol		208±48.27	184±26.82	0.003
3.	Left Ventricular Hypertrophy	YES (9)	5 (55.5%)	4 (44.5%)	0.003
		NO (91)	14 (15.4%)	77 (84.6%)	

**Figure 1:** Association between mean blood pressures (mm of Hg) and microalbuminuria

DISCUSSION

Microalbuminuria was known to occur early in the course of essential hypertension. Hypertensive nephropathy is a known cause of chronic kidney disease but in many cases it may remain under recognized. In the present study out of 100 patients examined the prevalence of microalbuminuria was 19%. Various studies conducted to estimate the level of microalbuminuria in hypertensive patients found wide range of prevalence i.e., from 23.2% in Tagore PK *et al*¹, 47% in HK Aggarwal *et al*², 67.83% in R Habbal *et al*³, 47% in Maxwell M. Nwegbu⁵ *et al* study and this may wide range of study settings and criteria for selecting patients. The high prevalence of MA in patients with essential hypertension in this part of country must raise an alarm amongst the health professionals about the rising subclinical chronic kidney diseases (CKD). The prevalence of microalbuminuria was more in males 19.7% when compared to female 17.9% but no statistical significant association was found between them which was similar to the findings of some studies.^{4,13} In study by Hitha *et al.* also, it was found that the prevalence of MA increased steadily in patients of hypertension with advancing age.¹⁶ In another large study of 11,343 nondiabetic hypertensive patients with a mean age of 57 years, MA was present in 32% of men and 28% of women and prevalence increased with age, severity, and duration of hypertension.¹⁷ The duration of hypertension was high in microalbuminuria cases 5.47 ± 2.32 years when compared to non-microalbuminuria patients 3.52 ± 1.26 years and a statistically significant association was found between them ($p < 0.05$). Various

studies conducted on the prevalence of microalbuminuria had also found that a direct association i.e., with increase in duration of hypertension the prevalence of microalbuminuria also increases.^{13,18} Body Mass Index (BMI) was statistically higher ($p < 0.05$) amongst the cases having micro-albumin in their urine which supports the already proven fact that high BMI among hypertensives are at high risk of micro-albuminuria. There is a positive correlation between micro-albuminuria and obesity which was also found in Hitha *et al* study.¹⁶ In the present study, LVH was present in significant number of patients with MA as compared to those without MA (55.5% vs. 15.4%, $P = 0.003$). Gatzka *et al.* studied 704 patients of essential hypertension and observed higher LVM in microalbuminuric patients than nonmicroalbuminuric patients.¹⁹ In a large study by Agrawal *et al.* of 11343 nondiabetic hypertensive patients, those with MA had a higher prevalence of LVH and other cardiovascular events as compared to those without MA.¹⁷

CONCLUSION

Our study demonstrates that the presence of MA in a significant number of essential hypertension cases. The prevalence of micro-albuminuria increases with the increase in duration and level of blood pressure. Micro-albuminuria can be considered as a marker of adverse cardiovascular risk profile such as Left Ventricular Hypertrophy. We recommend that early screening for microalbuminuria in patients of essential hypertension

and so that early initiation of treatment might help in reducing the morbidity and mortality.

REFERENCES

- Agewall S, Wikstrand J, Ljungman S, Fagerberg B. Usefulness of microalbuminuria in predicting cardiovascular mortality in treated hypertensive men with and without diabetes mellitus. Risk Factor Intervention Study Group. *Am J Cardiol*. 1997;80:164-9.
- Global Health Observatory (GHO) data. India: country profiles. https://www.who.int/nmh/countries/ind_en.pdf?ua=1 (last accessed on 11/02/2019).
- Bigazzi R, Bianchi S, Campese VM, Baldari G. Prevalence of microalbuminuria in a large population of patients with mild to moderate hypertension. *Nephron* 1992; 61:94-7.
- Aggarwal HK, Jain D, Mor S, Yadav RK, Jain P. Prevalence and Clinical Correlates of Microalbuminuria in Patients with Essential Hypertension-A Tertiary Care Center Cross Sectional Study. *J Association Physicians India*. 2016.
- Bianchi S, Bigazzi R, Campese VM. Microalbuminuria in essential hypertension: Significance, pathophysiology, and therapeutic implications. *Am J Kidney Dis* 1999; 34: 973-95.
- Plavnik FL, Silva MA, Kohlmann NE, Kohlmann O Jr., Ribeiro AB, Zanella MT. Relationship between microalbuminuria and cardiac structural changes in mild hypertensive patients. *Braz J Med Biol Res* 2002;35:799-804.
- Basi S, Fesler P, Mimran A, Lewis JB. Microalbuminuria in Type 2 Diabetes and Hypertension. A marker, treatment target, or innocent bystander? *Diabetes Care*. 2008; 31 Suppl2:S 194-201.
- Jensen JS, Feldt-Rasmussen B, Strandgaard S, Schroll M, Borch-Johnsen K. Arterial hypertension, microalbuminuria, and risk of ischemic heart disease. *Hypertension*. 2000; 35: 898-903.
- Pedrinelli R, Penno G, Dell'Omo G, Bandinelli S, Giorgi D, Di Bello V. Micro-albuminuria and transcapillary albumin leakage in essential hypertension. *Hypertension*. 1999; 34: 491-5.
- De Zeeuw D, Parving HH, Henning RH. Microalbuminuria as an early marker for cardiovascular disease. *J Am Soc Nephrol*. 2006; 17: 2100-5.
- Summerson J, Bell R, Konen J. Racial differences in the prevalence of microalbuminuria in hypertension. *Am J Kidney Dis* 1995; 26:577-9.
- Pontremoli R, Sofia A, Ravera M, Nicoletta C, Viazzi F, Tirota A, et al. Prevalence and clinical correlates of microalbuminuria in essential hypertension: The MAGIC Study. *Hypertension* 1997; 30:1135-43.
- Tagore PK, Gupta A, Kumar D, Yadav MS. Correlates of microalbuminuria in hypertensive patients of a tertiary care teaching hospital of Central India. *International Journal of Research in Medical Sciences*. 2016 Aug; 4(8):3402.
- Habbal R, Sekhri AR, Volpe M, i-Search Investigators. Prevalence of microalbuminuria in hypertensive patients and its associated cardiovascular risk in clinical cardiology: Moroccan results of the global i-SEARCH survey—a sub-analysis of a survey with 21 050 patients in 26 countries worldwide. *Cardiovascular journal of Africa*. 2010 Aug; 21(4):200.
- Nwegbu MM, Akintan GA, Irabor EO. Prevalence of microalbuminuria in newly diagnosed hypertensives in a tertiary hospital setting, using a semi-quantitative screening tool. *International Research Journal of Basic and Clinical Studies*. 2016 Mar; Vol.4 (1): pp. 010-013.
- 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: 411-9.
- Agrawal B, Berger A, Wolf K, Luft FC. Microalbuminuria screening by reagent strip predicts cardiovascular risk in hypertension. *J Hypertens* 1996; 14: 223-8.
- 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. *Journal of Clinical and Preventive Cardiology*. 2018 Jan 1;7(1):11.
- Gatzka CD, Reid CM, Lux A, Dart AM, Jennings GL. Left ventricular mass and microalbuminuria: Relation to ambulatory blood pressure. Hypertension Diagnostic Service Investigators. *Clin Exp Pharmacol Physiol* 1999; 26: 514-6.

Source of Support: None Declared
Conflict of Interest: None Declared