



Study on Microalbuminuria in Newly Diagnosed Hypertensive Patients

Authors

Marrapu Venkata Vivek^{1*}, Dr K Indira Devi MD², Dr T Manasa³, Dr Y Pranathi⁴

^{1,3,4}Postgraduate in General Medicine, Department of General Medicine, Andhra Medical College, KGH, Vizag

²Professor, Department of General Medicine, Andhra Medical College, KGH, Vizag

*Corresponding Author

Marrapu Venkata Vivek

Abstract

Background: Hypertension is one of the most frequent diagnosis in hospitalized/outpatients in our country with significant morbidity and mortality. Microalbuminuria has important cardiovascular implications in hypertensive patients. It is known to occur independently in diabetes mellitus and hypertension. Microalbuminuria is an independent risk factor of target organ damage like hypertensive retinopathy, abnormality of left ventricular function. It indicates the severity of the disease and has been considered an important prognostic indicator.

Objectives

- ❖ To observe microalbuminuria in newly diagnosed hypertensives
- ❖ To study the relationship between microalbuminuria and target organ damage (left ventricular hypertrophy)

Hundred hypertensive cases are evaluated for microalbuminuria. Microalbuminuria was measured in these patients by immunoturbidimetric assay.

Results: Significant microalbuminuria was observed to occur in hypertensive patients. The prevalence of microalbuminuria in this study is 32%. A positive correlation is noted between microalbuminuria and target organ damage. It was observed that there is a significant correlation between the prevalence of microalbuminuria and the presence of LVH ($P < 0.05$) in hypertensive patients.

Conclusion: Significant microalbuminuria was found to occur in newly detected hypertensive patients. This positive correlation between microalbuminuria and target organ damage in hypertensive patients calls for further studies with greater sample size.

Keywords: Microalbuminuria; Hypertension; Target organ damage.

Introduction

Hypertension is one of the major public health problems throughout the world.

Hypertension is estimated to cause 14% of total deaths. Blood pressure levels are positively related to the risk of stroke and coronary heart disease. In addition to coronary artery diseases and stroke,

complications include heart failure, peripheral vascular disease, retinal hemorrhage, visual impairment, and renal impairment. Maintaining systolic and diastolic blood pressure less than 140/90 mmHg is associated with a reduction in complications.

Primary hypertension produces clinical proteinuria and a notable reduction in renal function in 5 to 15% of patients. The advent of sensitive methods to quantify urinary albumin excretion (UAE) has revealed a higher prevalence (25-100%) of microalbuminuria in patients with hypertension compared to normotensives.

According to the National Kidney Foundation Microalbuminuria is defined as a Urine Albumin Excretion Rate (UAER) of approximately 30-300mg/d in at least two of three consecutive samples of nonketotic sterile urine. The relation between hypertension and microalbuminuria was described a long time ago. In 1976, Parving et al highlighted the association between the severity of hypertension and microalbuminuria. Microalbuminuria indicates a state of increased renal endothelial permeability. It is an easily measured marker of low-grade inflammation, diffuse endothelial dysfunction, and vascular disease burden. Hence, screening for microalbuminuria and follow up of patients is now a general practice in some countries, but not all.

Aims and Objectives

1. To observe microalbuminuria in newly diagnosed hypertensives
2. To study the association between microalbuminuria and target organ damage (left ventricular hypertrophy)

Materials and Methods

Study Area: Department of General Medicine, Andhra medical college, Visakhapatnam, Andhra Pradesh.

Study Population: The study was performed among the patients admitted in medical wards and those attending the medical Out-Patient Department of general medicine, Andhra medical college, Visakhapatnam.

Study Period: Approximately 9 months from January 2020 to September 2020.

Sample Size: Total of 100 patients who were newly diagnosed with hypertension was taken into study.

Sample design: Having had informed consent for participation from the patient and/ or patient caregiver, the patient was included in the study according to the following criteria.

Study Design: a cross-sectional study

Inclusion Criteria

1. Patients who are newly detected with hypertension with systolic BP >130mmHg and/or diastolic BP > 90 mmHg in at least 3 visits.
2. Age of more than or equal to 18 years.

Exclusion Criteria

1. Patients with age <18 years of age.
2. Patients with Diabetes Mellitus: Either history of diabetes or those newly detected. [FBS $\geq$ 126 mg/dl; 2 hr PPBS $\geq$ 200mg/dl]
3. Patients with a previous history of Ischemic Heart disease or any other congenital/ acquired heart diseases.
4. Patients with Albuminuria or history of any renal disease or any other Target organ diseases.
5. Patients with raised serum creatinine [>1.5 mg/dl] or urine examination showing RBC, WBC, or urine C&S yielding bacteria.

Statistical Method

A chi-square test was used to study the relationship between microalbuminuria and other variables. The p-value was calculated for all the variables.

For those variables with significant P-value, the odds ratio was calculated

Statistical Software

The statistical software namely social statistics was used for the analysis of the data and Microsoft Excel, and word have been used to generate graphs, tables, etc

Investigations did include

1. Fasting and Postprandial blood sugar
2. Serum creatinine

3. Complete Urine examination
4. Lipid profile
5. Electrocardiogram: was done for all cases to look for LVH. The Sokolow - Lyon Index and the Romhilt - Estes point score system was used to diagnosing LVH. Those patients who meet the criteria of either of these were regarded as having LVH.
6. Chest X-ray: was taken in all patients to look for cardiomegaly.
7. Echocardiogram: Done to assess LVH.
8. Urine albumin creatinine ratio(ACR) based on the recommendations of the National Kidney Foundation and American Diabetic Association

The average of the ACR values from 3 urine samples was used.

Early morning 1st voided midstream urine sample of 5ml collected.

Any value in between 30 - 300mg/gm or 3-30mg/mmol Creatinine was taken as microalbuminuria.

Results

32 out of 100 patients had microalbuminuria.

TOTAL	Microalbuminuria			
	Absent		Present	
	No.	%	No.	%
100	68	68%	32	32%

With increasing severity of hypertension, prevalence of microalbuminuria increases as there is significant P-value.

Stage of hypertension	TOTAL	Microalbuminuria			
		Absent		Present	
		No.	%	No.	%
High	14	12	85.7	2	14.2
Normal					
Stage I	31	26	83.8	5	16.12
Stage II	55	30	54.5	25	45.45

It was observed that 32 out of 100 patients had LVH [32%] detectable by ECHO. 16 out of 28 with LVH had MA (57.1%).

RELATIVE RISK OF DEVELOPING LVH IN PATIENTS WITH MICROALBUMINURIA

LVH	Microalbuminuria		Odds ratio = 4.67 Relative risk=2.57
	Present	Absent	
Present	16	12	
Absent	16	56	

LVH AND MICROALBUMINURIA IN STUDY SUBJECTS

LV H		Total No.	Microalbuminuria				X ² =11.2979 P = 0.000776
			Absent		Present		
			No of	%	No of	%	
			patients		patients		
Absent		72	56	77.77	16	22.22	
Present		28	12	42.85	16	57.14	

Discussion

The present study gauged the relationship of microalbuminuria with the indices of target organ damage in nondiabetic hypertensives, a correlation between microalbuminuria and severity of hypertension and occurrence of LVH.

The prevalence of microalbuminuria in the present study was 32% (32 out of 100 hypertensive patients). Stefano Bianchi et al. in 1999 published the first large scale study on the prevalence of microalbuminuria among hypertensives; it was found to be -35%.

In this study, microalbuminuria was found to have a positive correlation with the severity of Hypertension [P = 0.00614]. In Hitha B et al study (2008) 50 the prevalence of microalbuminuria was higher among those with blood pressure >160/100 than in those with SBP 140-159mm Hg and DBP 90-99mm Hg(46% vs 8.7%) Similar positive correlation was noted in i-SEARCH study (microalbuminuria was more prevalent with SBP ≥ 120mm Hg, DBP ≥100mm Hg)

Urine Albumin Excretion and Abnormalities in LV Structure and Function

It was observed that 32 out of 100 patients had LVH [32%] detectable by ECHO. 16 out of 28 with LVH had microalbuminuria(57.1%).C. Tsioufis et al. [2002], in their study, observed that 21% of the 249 had LVH. LVH is reported in nearly 30% untreated hypertensives. In this study, it was observed that there is a significant correlation between the prevalence of microalbuminuria and the presence of Left ventricular hypertrophy ($P < 0.05$) in hypertensive patients. The relationship between microalbuminuria and LV geometry may be due to hemodynamic or nonhemodynamic reasons. It is hypothesized that increased levels of ANP, which was secreted from hypertrophic ventricles, can directly induce microalbuminuria. The fact that heart failure patients with elevated ANP levels exhibit microalbuminuria gives further support to this view.

Conclusion

- 1) In this study prevalence of microalbuminuria is greater among stage 2 followed by stage 1 hypertensives, this concludes as severity of hypertension increases prevalence increases.
- 2) Among 28 patients with LVH ,16 patients had microalbuminuria indicating microalbuminuria is a prognostic marker for target organ damage(heart).
- 3) More extensive screening for microalbuminuria needs to be done in hypertensive subjects to facilitate better stratification of absolute cardiovascular risk, especially in patients with hypertension of more than five years duration.

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