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Original Research Article

Study of the Relationship Between Microalbuminuria and the Target Organ Damage in Patients of Essential Hypertension

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Abstract:

Background: It has long been understood that in people with hypertension, a crucial amount of urine albumin excretion serves as a trustworthy predictor of cardiovascular events. Very few studies have been conducted to date demonstrating a link between microalbuminuria and target organ damage in patients with essential hypertension, with the exception of cardiovascular events. We investigated the prevalence of microalbuminuria in patients with essential hypertension and its relationship to organ injury.

Methods: A total of 120 patients with essential hypertension were examined. Analysis was done on the frequency of urine albumin excretion and its connection to target organ damage such as stroke, retinopathy, and left ventricular hypertrophy. Urinary albumin excretion was assessed using turbidimetry, and the presence of microalbuminuria was assessed using the urine albumin to creatinine ratio.

Results: Microalbuminuria was discovered to be prevalent in 57.5% of the patients. The target organ was harmed in 82.5% (99 patients) of the cases, and microalbuminuria was also present in 82.82% of these situations ($p<0.05$). Patients with longer histories and more severe types of hypertensions, elevated body mass indices, and dyslipidemia were more likely to have these conditions.

Conclusions: Examining microalbuminuria is a critical diagnostic for identifying the severity of target organ damage in hypertensive patients. With ideal hypertension management, weight control, and maintenance of normal lipid levels, the risk of microalbuminuria is reduced.

Keywords: Essential hypertension, Microalbuminuria, Target organ damage.

Introduction

High blood pressure is the third most important risk factor for the associated burden of disease in south Asia.[1] Hypertension (HTN) has a severe negative impact on India's cardiovascular health status and healthcare infrastructure.[2,3]

Even though the illness of hypertension is commonly asymptomatic, it is linked to numerous types of target organ damage (TOD) and associated clinical disorders. While catastrophic events like stroke, heart attack, renal failure, etc. are typically brought on by long-term uncontrolled hypertension, subtle TOD like left ventricular hypertrophy (LVH), retinopathy, microalbuminuria, and cognitive dysfunction occur early in the natural course of hypertensive disease. The majority of these people suffer from essential hypertension, which is defined as an elevation in blood pressure with no known reason.

The existence of microalbuminuria (MA), defined as urinary albumin excretion rates of 20–200 mg/min or 30–300 mg/24 hr, urinary albumin to creatinine ratios greater than 30–300 mg/gm in the first morning sample, and early morning urinary albumin concentrations of 20–200 mg/L, in hypertensive adults, as independent predictors of cardiovascular (CV) morbidity and mortality, is strongly supported by the available data.[4-6] MA is the first sign of hypertensive (and diabetic) nephropathy. The discovery that medicines designed to strictly control blood pressure and blood sugar levels can prevent MA is equally significant.[7,8] The prevalence of MA and its relationship to TOD in people with essential hypertension are little understood in this part of the world. By determining the prevalence of MA, potential risk factors for its occurrence, and the relationship between MA and TOD among patients with essential hypertension, the current study aimed to narrow this gap.

Material and Methods

Between December 2021 and August 2022, a hospital-based observational study was conducted in

the Department of Medicine at Atal Bihari Vajpayee Institute of Medical Sciences and Ram Manohar Lohia Hospital, New Delhi. 120 people in total participated in the study. Secondary hypertension with documented cases, pregnancy, patients with diabetes, acute coronary syndrome, renal illness, urinary tract infection, elevated blood creatinine, macroproteinuria, and smokers were excluded from this study. Newly discovered hypertensives as well as diagnosed instances of hypertension (on regular/irregular/no treatment) were also included.

Data were collected using a pretested and confirmed proforma after getting participants' full, written consent. Every participant had a thorough medical history review, with special attention paid to the duration of hypertension and how it was treated, history of smoking, cardiovascular symptoms like angina, palpitations, dyspnea, and intermittent claudication, neurological symptoms like headache, seizures, transient ischemic attacks, and prior strokes, and visual symptoms like blurred or decreased vision, weakness in the limbs (hemiparesis/hemiplegia), etc.

Documentation of diabetes, first- and second-degree associated hypertension, coronary heart disease, and any previous significant illness was required. A personal history of smoking, chewing tobacco use, and eating (veg/non-veg/mixed) was also recorded. Each patient got a complete medical examination, with particular attention paid to assessing their neurological and cardiovascular problems as well as an inspection of the optic fundus. In addition to the standard tests (fasting lipid profile, ECG, x-ray chest, CT head (if necessary), 2D Echo, and albumin creatinine ratio), workup for secondary hypertension was performed wherever indicated.

In order to identify the existence of microalbuminuria (MA), urine albumin was quantified using turbidimetry in accordance with guidelines from the National Kidney Foundation and American Diabetes Association9,10. Five milliliters of the first morning urine sample were used. Patients were told not to exert themselves before urine collection. Female test subjects had their urine collected while they weren't having their periods. Microalbuminuria (MA) was defined for the study as ACR values between 30 and 300 mg/g of creatinine.[11]

The data were analyzed using SPSS (Version 16), which was used to perform the chi-square test and regression analysis.

Results

120 patients with essential hypertension were assessed during the course of the current study nine months examination period. The age categories of 40-49 years and 60-69 years had the highest percentages of patients, with a mean age of 53.53±12.56 years. 65 participants (54.17%) and 55 participants (45.83%) were men, respectively (M:F ratio: 1:0.86).

The majority of patients (59.16%) reported no symptoms, but headache was the most common presenting symptom (13.33%). Newly diagnosed hypertensives made up the majority of cases (64, 53.33%) and those with hypertension for less than five years (28.33%).

Of the 120 people with essential hypertension, 69 (57.5%) also had microalbuminuria (MA). Ageing, severe hypertension, dyslipidemia, obesity, and female gender were additional factors that markedly elevated the prevalence of MA (Table 1).

Table 1: Correlation of microalbuminuria with established risk factors

		No. of patients (n=120)	With Micoralbuminuria	Without Micoralbuminuria	p-value
Age	<60 years	75	36	39	P<0.05
	>60 years	45	33	12	
Gender	Male	65	27	38	P<0.05
	Female	55	42	13	
Blood pressure	<140/90	21	0	21	P<0.05
	Systolic 140-160 Diastolic 90-100	66	45	21	
	>160/100	33	24	9	
Dyslipidemia	Present	100	53	47	P<0.05
	Absent	20	16	4	
Obesity	Present	81	40	41	P<0.05
	Absent	39	29	10	

The duration of hypertension was revealed to be directly correlated with the prevalence of MA, with the exception of the group of 5 years duration, and the difference between categories was significant. Furthermore, patients receiving irregular, or no therapy had a higher likelihood of having high prevalence than those receiving regular care (Table 2).

Table 2: Prevalence of microalbuminuria with respect to duration of hypertension and compliance to antihypertensive therapy

	No. of patients (n=120)	Micoralbuminuria present	p-value
Duration of hypertension			
Unknown duration	04(3.33%)	02(50%)	χ^2 for linear trend= 9.233, P= 0.0023
Newly diagnosed	64(53.33%)	44(68.75%)	
<5 years	34(28.33%)	10(29.41%)	
5-10 years	16(13.33%)	11(68.75%)	
>10 years	02(1.66%)	02(100%)	
Compliance to anti-hypertensive therapy			
Regular treatment	46(38.33%)	18(39.13%)	χ^2 for linear trend= 10.41, P= 0.006
No treatment	44(36.66%)	31(70.45%)	
Irregular treatment	30(25%)	20(66.66%)	

In 99 (82.5%) of the 120 people with essential hypertension, target organ damage (TOD) occurred, and in 82 (82.82%) of them, microalbuminuria was present.

Microalbuminuria was discovered to be significantly correlated with target organ damage (TOD) in the forms of stroke, retinopathy, and LVH (P=0.0072, 0.0041, and 0.001 respectively) (Table 3).

Dyslipidemia, LVH, stroke, and retinopathy remained independently correlated with MA even after multivariate analysis (Table 3).

Table 3: Correlation of microalbuminuria with target organ damage (TOD)

Target organ damage	No. of patients (n=99)	Micoralbuminuria present	p-value
Stroke	13(10.83%)	12(92.3%)	0.059
Retinopathy	51(42.5%)	37(72.54%)	0.0037
Left ventricular hypertrophy	35(29.16%)	33(94.28%)	<0.001

Discussion

In order to determine the prevalence of microalbuminuria (MA), potential risk factors for its formation, and the relationship between microalbuminuria (MA) and target organ damage (TOD) in essential hypertension patients, a total of 120 patients with the condition were included in the current study.

In comparison to the 6.7%–40.0% range previously identified by researchers in studies of a similar nature, MA was discovered in 82 (82.82%) of the cases, which is higher.[5,12-15] The slightly higher blood pressure readings among research participants as well as the fact that the majority of patients were receiving inconsistent or no treatment were two potential contributing factors.

Over time, MA has become recognized as a predictor of CV risk in individuals with diabetes.16,17 Its importance in people with essential hypertension is becoming increasingly obvious with each new study. Data from the current analysis support claims that MA was connected to aging, a longer duration and greater severity of hypertension, obesity, and dyslipidemia.[18-20] The incidences of left ventricular hypertrophy (94.28%), stroke (92.3%), and progressive retinal changes (72.54%) were also significantly greater in patients with MA. Dyslipidemia, LVH, and retinopathy were independently associated with MA even after multivariate analysis. This indicates that the likelihood of having macro- and microvascular issues is significantly higher in hypertensives with microalbuminuria than it is in those without.

Pontremoli et al. also found significant ECG abnormalities and vascular retinal changes in the MAGIC study, indicating significant correlations between MA and TOD. Hitha et al.[12] discovery of a similar correlation between the presence of MA and a higher risk of stroke and retinopathy lends credence to our findings.[13]

The theory that there is some degree of continuum of correlation between CV risk factors and the process from early to final renal damage is based on the idea that the presence of MA is the renal manifestation of generalized increased endothelial dysfunction that occurs as part of the disease process.[15,20,21]

Conclusion

In conclusion, decreasing or eliminating preventable risk factors (such as regular HT therapy, maintaining a healthy weight, and maintaining normal cholesterol levels) may help to prevent, delay, or lessen the prevalence of MA. MA in hypertensive people may show to be a useful marker in the assessment of target organ damage. By promptly treating positive cases of MA in hypertensive patients, the burden of cardiovascular and chronic

renal disorders in the neighborhood may be reduced.

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