

Original Research Article

Study of correlation of presence of microalbuminuria to target organ damage in essential hypertension cases at SKMCH, Muzaffarpur, Bihar

¹Dr. Aquil Ahmed Mumtaz, ²Dr. Zeeshan Ahmed Mumtaz

M.B.B.S., M.D. (Medicine), Associate Professor & HOD, Department of Medicine, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar.

M.B.B.S., M.D., DM (Cardiology), DNB (Cardiology), Assistant Professor, Department of Medicine and HOD of Cardiology Department, Central Referral Hospital, SMIMS, Sikkim-Manipal University.

Corresponding Author: Dr. Zeeshan Ahmed Mumtaz

ABSTRACT

Background: It has long been known that a critical level of urine albumin excretion is a reliable indicator of cardiovascular events in hypertension patients. Except for cardiovascular events, very few studies have been done to date showing a relationship between microalbuminuria and target organ damage in patients with essential hypertension. In individuals with essential hypertension, we looked at the frequency of microalbuminuria and how it related to organ damage.

Methods: 120 patients with essential hypertension in total were investigated. Analysis was done on the prevalence of urine albumin excretion and its relationship to stroke, retinopathy, and left ventricular hypertrophy as target organ damage. Turbidimetry was used to measure the excretion of urinary albumin, and the urine albumin to creatinine ratio was used to measure the presence of microalbuminuria.

Results: In 57.7% of the patients, microalbuminuria was discovered to be present. In 62.5% (75 patients) of the cases, the target organ was damaged, and in 78.66% of these cases, microalbuminuria was also present (p 0.05). Among these, patients with longer durations and more severe forms of hypertension, elevated body mass indexes, and dyslipidemia showed higher prevalence.

Conclusions: A crucial diagnostic for determining the extent of target organ damage in hypertensive individuals is the examination of microalbuminuria. Reduced risk of microalbuminuria results with optimal hypertension management, weight control, and maintenance of normal lipid levels.

Keywords: Essential hypertension, Microalbuminuria, Target organ damage

INTRODUCTION

The third most significant risk factor for the attributable burden of disease in south Asia is high blood pressure.¹ The cardiovascular health status and healthcare systems in India are significantly impacted by hypertension (HTN).^{2,3}

Even while hypertension as a disorder is frequently asymptomatic, it is connected to many forms of target organ damage (TOD) and related clinical conditions. Early in the natural course of hypertensive disease, subtle TOD, such as left ventricular hypertrophy (LVH), retinopathy, microalbuminuria, and cognitive dysfunction occur, whereas catastrophic events, such as stroke, heart attack, renal failure, etc., are typically brought on by long-term uncontrolled hypertension. Most of these individuals have essential hypertension, which is characterised as an increase in blood pressure with no identified cause.

There is strong evidence to support the hypothesis that microalbuminuria (MA), which is defined as urinary albumin excretion rates of 20–200 mg/min or 30–300 mg/24 hr, urinary albumin to creatinine ratios of greater than 30–300 mg/gm in the first morning sample, and early morning urinary albumin concentrations of 20–200 mg/L, occur in hypertensive adults as independent predictors of cardiovascular (CV) morbidity and mortality. The initial indicator of hypertensive (and diabetic) nephropathy is 4–6 MA. The finding that MA can be reversed by therapies meant to tightly regulate blood pressure and blood sugar levels is also significant.^{7,8}

There is a dearth of information from this region of the world about the prevalence of MA and its link to TOD in individuals with essential hypertension. The goal of the current study was to close this gap by assessing the prevalence of MA, potential risk factors for its occurrence, and the association between MA and TOD among patients with essential hypertension.

MATERIAL AND METHODS

A hospital-based observational study was undertaken between September 2021 and July 2022 in the Department of Medicine at Sri Krishna Medical College and Hospital in Muzaffarpur, Bihar. The study involved 120 participants in all. The exclusion criteria for this study were proven cases of secondary hypertension, pregnancy, patients with diabetes, acute coronary syndrome, renal disease, urinary tract infection, raised serum creatinine, macroproteinuria, and smokers. Diagnosed cases of hypertension (on regular/irregular/no treatment) were also included, as were newly detected hypertensives.

After receiving participants' full, written consent, a pretested and verified proforma was used to gather data. All of the participants underwent a thorough medical history check, with particular 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.

Diabetes, first- and second-degree related hypertension, coronary heart disease, and a history of any serious sickness were all dutifully documented. A personal history of drinking, eating (veg/non-veg/mixed), smoking, and chewing tobacco was also kept. Each patient underwent a thorough physical examination with a focus on the evaluation of their neurological and cardiovascular conditions as well as an optic fundus examination. Workup for secondary hypertension was carried out wherever necessary in addition to regular tests (fasting lipid profile, ECG, x-ray chest, CT head (where needed), 2D Echo, and albumin creatinine ratio).

Based on recommendations from the National Kidney Foundation and American Diabetes Association,^{9,10} urine albumin was measured using turbidimetry to determine the presence of microalbuminuria (MA). First morning urine sample, five millilitres, was used. Prior to urine collection, patients were instructed to refrain from exertion. Urine tests on female subjects were conducted when they weren't menstruating. For the purposes of the study, Microalbuminuria (MA) was defined as ACR values between 30 and 300 mg/gm of creatinine.¹¹

The chi-square test and regression analysis were carried out as suggested using SPSS (Version 16), which was utilised to analyse the data.

RESULTS

In the current investigation, 120 patients with essential hypertension were examined during a two-year period. With a mean age of 53.53 ± 12.56 years, the age groups of 40-49 years and 60-69 years had the highest percentages of patients. 55 participants (45.83%) were female and 65 (54.16%) male (M:F ratio- 1:0.84).

Headache was the most frequent presenting symptom (13.33%), although the vast majority of patients (59.16%) reported no symptoms. The majority of cases (64, 53.33%) and those with hypertension for less than five years (28.33%) were newly diagnosed hypertensives.

69 (57.5%) of the 120 individuals with essential hypertension also had microalbuminuria (MA). Other characteristics that significantly increased the prevalence of MA included advancing age, severe hypertension, the presence of dyslipidemia, obesity, and female gender (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	5	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	

Except for the category of 5 years duration, the length of hypertension was shown to be directly linked to the prevalence of MA, and the difference across categories was substantial. Additionally, compared to individuals receiving regular treatment, high prevalence was more common among patients receiving irregular or no treatment (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(36.36%)	31(70.45%)	
Irregular treatment	30(25%)	20(66.66%)	

Out of 120 individuals with essential hypertension, 75 (62.5%) developed target organ damage (TOD), of which 59 (78.66%) had microalbuminuria.

The remaining 45 (37.5%) patients had no (TOD), and only 10 (22.22%) of them had microalbuminuria. Target organ damage (TOD) in the form of stroke, retinopathy, and LVH was found to be substantially linked with microalbuminuria (P=0.0072, 0.0041, and 0.001 correspondingly) (Table 3).

Even after multivariate analysis, dyslipidemia, LVH, stroke, and retinopathy continued to be independently related with MA (Table 3).

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

Target organ damage	No. of patients (n=120)	Micoralbuminuria present	p-value
Stroke	13(10.83%)	12(92.3%)	0.072
Retinopathy	51(42.5%)	37(72.54%)	0.0041
Left ventricular hypertrophy	35(29.16%)	33(94.28%)	<0.001

DISCUSSION

A total of 120 patients with essential hypertension were included in the current study to examine the prevalence of microalbuminuria (MA), potential risk factors for its occurrence, and the connection between microalbuminuria (MA) and target organ damage (TOD) in essential hypertension patients.

MA was found in 69 (57.5%) of the cases, which is larger than the 6.7%–40.0% range previously noted by researchers in studies of a comparable kind.^{5,12-15} The likely causes could include the somewhat higher blood pressure readings among research participants as well as the fact that the majority of patients were receiving inconsistent or no treatment.

MA has gradually come to be recognised as a predictor of CV risk in people with diabetes over time.^{16,17} With each new study, the significance of its existence in patients of essential hypertension becomes more and more clear. According to reports, MA was linked to ageing, a

longer duration and greater severity of hypertension, obesity, and dyslipidemia; data from the current investigation corroborate these reports.¹⁸⁻²⁰ Patients with MA were shown to have considerably higher rates of left ventricular hypertrophy (94.28%), stroke (92.3%), and progressive retinal alterations (72.54%). Even after multivariate analysis, dyslipidemia, LVH, and retinopathy continued to be independently linked with MA. This means that hypertensives with microalbuminuria have much higher risks than those without of developing macro- and microvascular problems.

In the MAGIC trial, Pontremoli et al. also revealed significant associations between MA and TOD in the form of significant ECG irregularities and vascular retinal alterations. Further supporting our findings, Hitha et al.⁽¹²⁾ found a similar association between the presence of MA and a greater incidence of stroke and retinopathy.¹³

It is believed that the presence of MA is the renal manifestation of generalised increased endothelial dysfunction that occurs as part of the disease process, which gives rise to the theory that there is some degree of continuum of correlation between CV risk factors and the process from early to final renal damage.^{15,20,21}

CONCLUSION

The authors state in their conclusion that controlling preventable risk factors (regular HT treatment, weight control, and normal lipid levels) may have a positive impact on preventing, delaying, and reducing the prevalence of MA. MA in hypertensive subjects may prove to be a valuable marker in the evaluation of target organ damage, the authors write. Early detection of MA in hypertensive patients and timely treatment of positive cases could lessen the burden of cardiovascular and chronic renal diseases in the neighbourhood.

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