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PREVALENCE OF MICROALBUMINURIA IN HYPERTENSIVE PATIENTS IN DARBHANGA MEDICAL COLLEGE LAHERIASARAI DARBHANGA AND HOSPITAL

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Abstract

Introduction: There are two mechanisms proposed for the greater urinary albumin excretion (UAE) in patients with essential hypertension: increased glomerular hydrostatic pressure or increased selectivity of the glomerular basement membrane. In hemodynamic mechanism regulation of the glomerular hydrostatic pressure is regulated by the relative vasoconstriction vasodilatation of the afferent and efferent glomerular arterioles. Hypertension is one of the major public health problems in the world. In India the prevalence of hypertension is about 25% in urban and 10-15% in rural, adult population as compared to west which is 30%. Essential hypertension is responsible for producing clinical proteinuria and a significant reduction in renal function in 5-15% of patients. Several studies have shown that proteinuria and microalbuminuria are independent predictors of cardiovascular morbidity and mortality in patients with hypertension. Some data suggest that reduction of albumin excretion rate reduces the risk of adverse renal and cardiovascular events (CVEs).

Material and Methods: Patients, who had high blood pressure based on JNC 8 (Joint National Commission 8) criteria during three subsequent visits to the outpatient clinic and a creatinine clearance greater than 80 ml/min/1.73 m^2, were included in the study. A total of 546 essential hypertensive patients whose BP was> 140/90 mm Hg in nondiabetics and BP >130/85 mm Hg in diabetic patients were included in the study. Blood pressure monitoring was done according to the WHO guidelines. Demographic data, age, sex, weight, associated cardiovascular disease, albuminuria, and clinical parameters were all recorded. All routine biochemical tests and microalbuminuria tests were performed by the laboratory. Blood and urine creatinine were measured using an autoanalyzer.

Results: There were 322 (58.97%) male and 224 (41.02%) female included in the study. Left ventricular hypertrophy was observed in 267 (48.9%) of the patients, retinopathy was seen in 54 (9.89%) and microalbimunira was observed in 297(54.4%) of hypertensive patients. 129 (23.63%) were smokers. Statistical significance was observed renal parameters except serum uric acid levels.

Conclusion: Prevalence of microalbuminuria in hypertensive patients warns that screening for microalbuminuria is essential for intervention and prevention of complications and renal diseases. Also it is necessary to screen the patients for early nephropathy to halt the disease progression.

Introduction:

Patients with essential hypertension have a prevalence of proteinuria ranging from 4% to 16%. The prevalence of microalbuminuria varies in different studies, with rates ranging from 5% to 37%[i,ii]. There are two mechanisms proposed for the greater urinary albumin excretion (UAE) in patients with essential hypertension: increased glomerular hydrostatic pressure or increased selectivity of the glomerular basement membrane. In hemodynamic mechanism regulation of the glomerular hydrostatic pressure is regulated by the relative vasoconstriction vasodilatation of the afferent and efferent glomerular

arterioles. The tone of arterioles is regulated by various mechanisms, and their sensitivity to pressor depressor substances also varies substantially[iii]. An elevation of systemic arterial pressure is associated with vasoconstriction of the glomerular afferent arterioles, and prevents transmission of the elevated hydrostatic pressure to the glomerulus thus maintains the glomerular hydrostatic pressure unaltered[iv].

Hypertension is one of the major public health problem in the world. In India the prevalence of hypertension is about 25% in urban and 10-15% in rural, adult population as compared to west which is 30%[v]. Essential hypertension is responsible for producing clinical proteinuria and a significant reduction in renal function in 5-15% of patients. Several studies have shown that proteinuria and microalbuminuria are independent predictors of cardiovascular morbidity and mortality in patients with hypertension[vi]. Hypertension increases the risk of cardiovascular diseases, like coronary heart disease, ischemic and haemorrhagic stroke (cerebrovascular accident), renal failure, peripheral arterial disease and congestive heart failure. An increased albumin excretion rate is a predictor of poor renal outcomes in patients with type 2 diabetes and in those with essential hypertension[vii].

Some data suggest that reduction of albumin excretion rate reduces the risk of adverse renal and cardiovascular events (CVEs). Increased urinary excretion of albumin ranging between 30 and 300 mg/d can be called as microalbuminuria, has been found in a relatively large number of patients with essential hypertension[viii],[ix]. With this background this study was carried out to look for the prevalence of microalbuminuria in patients with essential hypertension

MATERIAL AND METHODS

This is an observational, prospective, study in hypertensive patients carried out in the department of Medicine at Darbhanga Medical College Laheriasarai Darbhanga and hospital.

Patients who had high blood pressure based on JNC 8 (Joint National Commission 8) criteria during three subsequent visits to the outpatient clinic and a creatinine clearance greater than 80 ml/min/1.73 m^2, were included in the study.

Renal cause for hypertension was excluded based on results of normal urinalysis, serum creatinine, serum electrolytes, creatinine clearance, and renal ultrasonography. A total of 546essential hypertensive patients whose BP was> 140/90 mm Hg in nondiabetics and BP >130/85 mm Hg in diabetic patients were included in the study. Protocol was approved by the Clinical Research Ethical Committee.

Exclusion of patients was done if: Patients treated with angiotensin-converting enzyme inhibitors or angiotensin II receptor antagonists during at least the 2 weeks. Patients with secondary hypertension or BP ≥ 210/110 mm Hg, type 1 diabetes andhyperkalemia>5.5 mEq/L. Patients also excluded with evidence of hepatic, renal, thyroid, or any other major disease and women on birth control pills.

Blood pressure monitoring was done according to the WHO guidelines[x]. After five minutes of rest Blood pressure was measured using a mercury sphygmomanometer,Average of three consecutive measurements taken over a 15-minute period was calculated. Mean arterial pressure was calculated adding diastolic blood pressure with one-third of pulse pressure. Demographic data, age, sex, weight, associated cardiovascular disease, albuminuria, and clinical parameters were all recorded. All routine biochemical tests and microalbuminuria tests were performed by the laboratory. Blood and urine creatinine were measured using an autoanalyzer. Urine for estimation of microalbuminuria was stored at -200°C until the processing of samples. Echocardiogram was done to look for any cardiac abnormality and left ventricular hypertrophy.

Statistical analysis was performed by using standard methods to calculate rates and proportions; Z test was used for analyzing the differences between the variables.. A P value of < 0.05 was considered as statistically significant.

OBSRVATIONS AND RESULTS:

A total of 546 essential hypertensive patients whose BP was > 140/90 mm Hg in nondiabetics and BP >130/85 mm Hg in diabetic patients were included in the study. There were 322 (58.97%) male and 224 (41.02%) female.

TABLE 1: Demographic characteristics and other variables

Variables/ characteristics	Present	%	Absent	%
Left ventricular hypertrophy	267	48.90	279	51.10
Retinopathy	54	9.89	492	90.11
Smokers	129	23.63	417	76.37
Microaluminuria	297	54.40	249	45.60

Left ventricular hypertrophy was observed in 267 (48.9%) of the patients, retinopathy was seen in 54 (9.89%) and microalbuminuria was observed in 297(54.4%) of hypertensive patients. 129 (23.63%) were smokers.

Table 2: Parameters in microalbuminuric and normal patients

Parameters	Microalbuminuric cases (n= 354)		Normal albumin level (n=303)		P value
	Mean	SD	Mean	SD	
Systolic Blood pressure (mmHg)	162.45	19.54	144.87	17.54	<0.00001
Diastolic Blood pressure (mmHg)	106.21	10.54	85.96	11.24	<0.00001
BMI	28.55	3.14	26.74	1.22	<0.00001
Serum Urea	36.74	7.48	33.47	7.44	<0.00001
Serum Creatinine	0.93	0.197	0.84	0.12	<0.00001
Serum uric acid	4.44	0.89	4.38	0.88	0.3869
serum Cholesterol	198.54	40.57	180.4	32.77	<0.00001
urinary albumin excretion (mg/ 24 hours)	30.96	5.7	18.13	1.88	<0.00001

Statistical significance was observed in all above mentioned renal and other parameters except serum uric acid levels

DISCUSSION

Microalbuminuria occurs frequently in the general population, even in persons without hypertension. Microalbuminuria is associated with an enhanced risk for cardiovascular morbidity and mortality, and with an enhanced risk for progressive renal failure in hypertensive and in non-diabetic, non-hypertensive subjects[xi].

Studies have proved that there is an association between microalbuminuria and high levels of blood pressure. Ahmedani et al. showed microalbuminuria positive group had a higher systolic and diastolic blood pressure compared to microalbuminuria negative group ($p<0.001$)[xii]this was in accordance with our study. Afkhami Arkedani et al. showed a statistical correlation between the prevalence of microalbuminuria and the diastolic blood pressure[xiii].Pasko et al reported that microalbuminuric patients had higher systolic and diastolic blood pressure, which shows that systolic blood pressure is a significant risk factor for diabetic nephropathy[xiv].

In the conventional methodsfor detecting renal damage in hypertensive peoples, includes the measurement of blood urea nitrogen, creatinine and proteinuria. This method is relatively insensitive and only shows abnormalities when the advanced disease process.The quantitative measurement of albuminuria to detect the subtle effects of hypertension on the kidney is now a day's well known process. The prevalence of microalbuminuria from 15 to 100%[xv]. In our study there was significant difference in the levels of serum urea and serum creatinine levels in microalbuminuric patients and normal albumin level patients. No significant difference was observed in serum uric acid levels. Svensson et al. observed that high blood pressure can increase the risk of developing signs of nephropathy[xvi]. Epidemiological studies have shown that identification and monitoring patients with microalbuminuria is utmost important because its treatment can prevent or postpone overt nephropathy[xvii].

CONCLUSION

In our study high prevalence of microalbuminuria in hypertensive patients warns that screening for microalbuminuria is essential for intervention and prevention of complications and renal diseases. Also it is necessary to screen the patients for early nephropathy to halt the disease progression.

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