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MICROALBUNURIA IN HYPERTENSIVE PATIENTS ATTENDING GENERAL MEDICINE OPD AT PRAKASH INSTITUTE OF MEDICAL SCIENCE & RESEARCH URUN-ISLAMPUR, MAHARASHTRA, INDIA.

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Conflicts of Interest: Nil

ABSTRACT:

INTRODUCTION: *Hypertension is a major public health problem all over the world and in India the prevalence of hypertension is around 25% in urban and 10-15% in rural, adult population while in the West it is 30%. Albumin is recognized as the earliest sign of vascular damage in both the kidney and the heart and albuminuria and its association with kidney disease. Proteinuria and microalbuminuria are independent predictors of cardiovascular morbidity and mortality in patients with hypertension. Kidney disease is linked to heart disease and the presence of microalbuminuria which can be defined as urinary albumin excretion of 30 - 300 mg / day, or 20-200 µg/min is a predictor of worse outcomes for both kidney and heart patients. Microalbuminuria does not directly cause cardiovascular diseases but it serves as a marker for identifying those who may be at increased risk of cardiovascular episodes. Albuminuria might reflect a general vascular dysfunction and leakage of albumin and other plasma macromolecules like low density lipoproteins which lead to inflammatory responses and start the atherosclerosis process.*

MATERIAL AND METHODS: *This is an observational, cross-sectional study done in hypertensive patients. Blood pressure monitoring was carried out according to the WHO guidelines. The values reported were the average of three consecutive measurements taken over a 15-minute period. All routine biochemical tests and microalbuminuria tests were performed by the laboratory. All patients determined to have microalbuminuria who matched the inclusion criteria were enrolled for a 1-year follow-up. Statistical analysis was performed by using standard methods to calculate rates and proportions.*

RESULTS: *A total of 157 patients were included in the study. Out of which 96 (61%) were male and 61 (39%) were female. Retinopathy was observed in 21 (13%) cases and Left ventricular hypertrophy was seen in 67 (43%) patients. Microalbuminuria was observed in 92 (59%) cases. Systolic Blood pressure and diastolic blood pressure in microalbuminuric cases was 163.5±19.2, and 101.6±8.9 respectively, while in normal patients it was 144.3±17.2 and 85.4±11.2. There was significant difference observed in microalbuminuric and normal cases in terms of serum urea, serum creatinine, serum uric acid and serum cholesterol. Urinary albumin excretion was significantly higher in microalbuminuric cases as compared to normal patients.*

CONCLUSION: *The prevalence of microalbuminuria among patients with essential hypertension was 59% and was associated with higher blood pressure values. . Prevalence of microalbuminuria in*

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hypertensive patients suggests that screening for microalbuminuria is essential for intervention and prevention of further complications.

Introduction

Hypertension is a major public health problem all over the world and in India the prevalence of hypertension is around 25% in urban and 10-15% in rural, adult population while in the West it is 30%[i].Hypertension in the diabetic patients markedly increases the risk and accelerates the course of cardiac disease, peripheral vascular disease, stroke, retinopathy, and nephropathy[ii].Albumin is recognized as the earliest sign of vascular damage in both the kidney and the heart and albuminuria and its association with kidney diseasehas been recognized for more than 200 years[iii].Several studies have shown that proteinuria and microalbuminuria are independent predictors of cardiovascular morbidity and mortality in patients with hypertension.Kidney disease is linked to heart disease and the presence of microalbuminuria which can be defined as urinary albumin excretion of 30 - 300 mg / day, or 20-200 µg/minis a predictor of worse outcomes for both kidney and heart patients. In America, approximately 6% of men and 9.7% of woman have microalbuminuria[iv]. Microalbuminuria does not directly cause cardiovascular diseases but it serves as a marker for identifying those who may be at increased risk of cardiovascular episodes. Microalbuminuria is caused by glomerular capillary injury and so it may be a marker for diffuse endothelial dysfunction[v] .In patients with essential hypertension, the combined presence of microalbuminuria and hyperlipidaemia is frequently seen. There is possibility for the association between microalbuminuria and hyperlipidaemiabecause of abnormal intake of lipids with the diet.

Albuminuria might reflect a general vascular dysfunction and leakage of albumin and other plasma macromolecules like low density lipoproteins which lead to inflammatory responses and start the atherosclerosis process[vi]. Two mechanisms have been proposed for the urinary albumin excretion (UAE) in some of the patients with essential hypertension first,increased glomerular hydrostatic pressure and second, increased permeability of the glomerular basement membrane[vii].

MATERIAL AND METHODS

This is an observational, cross-sectional study done in hypertensive patients. The present study was carried out at Prakash Institute of Medical Science & Research Urun-Islampur. The Out Patient Clinic of Department of General Medicine.Patients who recorded a high blood pressure based on JNC 8 (Joint National Commission 8) criteria during three consecutive visits to the outpatient clinic and who had a creatinine clearance greater than 80 ml/min/1.73 m2, were included in the study. Age group included in the study was 25 to 70 years.

Patients with Diabetes Mellitus, secondary hypertension, BP more than 210/110 mm Hg, unstable hypertension and hyperkalaemia were excluded from the study. Pregnant ladies were excluded from the study. Patients with clinical or laboratory evidence of hepatic, renal, or any other major disease and renal cause of hypertension were also excluded from the study. Patients who had been treated with angiotensin-converting enzyme inhibitors or angiotensin II receptor antagonists (ARBs) during at least the 2 weeks were excluded.

Blood pressure monitoring was carried out according to the WHO guidelines[viii]. Blood pressure was measured after five minutes of rest using a mercury sphygmomanometer, the values reported were the average of three consecutive measurements taken over a 15-minute period. 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. Patients' visits were scheduled at the beginning, at 6 months, and at the end of the study i.e. after 12 months. All routine biochemical tests and microalbuminuria tests were performed by the laboratory. All patients determined to have

microalbuminuria who matched the inclusion criteria were enrolled for a 1-year follow-up.

Statistical analysis was performed by using standard methods to calculate rates and proportions; Z test was used for analysing the differences between the variables. A two-tail *P* value was used for calculating statistical significance. A *P* value of < 0.01 was considered as statistically significant.

RESULTS

A total of 157 patients were included in the study. Out of which 96 (61%) were male and 61 (39%) were female. Retinopathy was observed in 21 (13%) cases and Left ventricular hypertrophy was seen in 67 (43%) patients. Microalbuminuria was observed in 92 (59%) cases.

Table 1:

Total patients (n)	157	percentage
Male	96	61%
Female	61	39%
Retinopathy		
Present	21	13%
Absent	136	87%
Left ventricular Hypertrophy (LVH)		
Present	67	43%
Absent	90	57%
Microalbuminuria		
Present	92	59%
Absent	65	41%

Table 2: Parameters in microalbuminuric and normal patients

Parameters	Microalbuminuric cases (n= 92)		Normal albumin level (n=65)		P value	Significance
	Mean	SD	Mean	SD		
Duration of Hypertension	48.4	11.6	31.5	12.9	P < 0.0001	Significant
Systolic Blood pressure (mmHg)	163.5	19.2	144.3	17.2	P < 0.0001	Significant
Diastolic Blood pressure (mmHg)	101.6	8.9	85.4	11.2	P < 0.0001	Significant
BMI	29.5	2.8	26.4	2.1	P < 0.0001	Significant
Serum Urea	35.4	8.1	34.2	6.9	P < 0.0001	Significant
Serum Creatinine	0.92	0.18	0.81	0.13	P < 0.0001	Significant
Serum uric acid	4.3	0.9	4.1	0.7	P = 0.1359	Not Significant
serum Cholesterol	193.4	38.4	177.5	31.4	P < 0.0001	Significant
urinary albumin excretion (mg/ 24 hours)	30.5	5.1	18.4	0.8	P < 0.0001	Significant

Duration of hypertension in Microalbuminuric cases was 48.4±11.6 while in normal patients it was 31.5±12.9, it was highly significant. Systolic Blood pressure and diastolic blood pressure in microalbuminuric cases was 163.5±19.2, and 101.6±8.9 respectively, while in normal patients it was 144.3±17.2 and 85.4±11.2 both results were highly significant. Body mass index (BMI) in microalbuminuric cases was 29.5±2.8 and in normal cases it was 26.5±2.1. There was significant difference observed in microalbuminuric and normal cases in terms of serum urea, serumcreatinine, serum uric acid and serum cholesterol. Urinary albumin excretion was significantly higher in microalbuminuric cases as compared to normal patients

DISCUSSION

Present study was conducted at Prakash Institute of Medical Science & Research Urun-Islampur in the department of General Medicine. Microalbuminuria can occur frequently in the general population, even in subjects without hypertension. There is evidence that, in diabetes, already modestly increased levels of albumin excretion are associated with an increased glomerular filtration rate (GFR) in patients with essential hypertension and in non-diabetic non-hypertensive subjects. Microalbuminuria is associated with an enhanced risk for cardiovascular morbidity and mortality, with an enhanced risk for progressive renal failure in hypertensive and in non-diabetic, non-hypertensive subjects[ix]. Therefore screening for microalbuminuria was found to an excellent tool, either alone or in combination with screening for hypertension and hypercholesterolemia[x].

Renal dysfunction is a common clinical condition in patients with hypertension and is associated with an increased risk for CVEs as well as progression to end-stage renal disease[xi,xii]. Studies have shown that the presence of microalbuminuria also increases the relative risk of an adverse cardiovascular episode like hypercholesterolemia[xiii].

In our study it was found that microalbuminuria in our study was 59%. Similar findings was shown byPoudel B et al in their study percentage of microalbuminuria in essential hypertensive patients was 51.88%[xiv]. The prevalence of microalbuminuriaand it may vary from 15 to 100% may be due to differences in age, race, severity of hypertension, and coexistent renal disease in the study populations[xv].Microalbuminuria should be tested routinely in all hypertensive patients as its appearance, progression to proteinuria can be correlated with a higher or lower risk of coronary heart disease, stroke, or peripheral vascular disease. That means urinary albumin excretion is a marker of cardiovascular risk, and also a marker of treatment efficacy. In a study by *Bramlage P*[xvi]et al showed prevalence of 21.2% of microalbuminuria in patients with hypertension. *Hillege HL* et al. found that microalbuminuria is also common in a nondiabetic, nonhypertensive population, and an indicator of cardiovascular risk factors and cardiovascular morbidity[xvii].

In our study there was a significant difference in the level of serum urea, creatinine, uric acid and cholesterol in microalbuminuria patients and normal individuals. In a study by Marudhaiveeran et al. found significant difference between urinary albumin excretion but he did not found significance in serum urea, creatinine, uric acid and cholesterol and according to them up to 80% of hypertensive patients show a concomitant cardiovascular risk factor[xviii].

The risk factors associated with microalbuminuria was found to be poor blood glucose control and hypertension and excretion of even small amounts of albumin in the urine may portend serious future events, such as elevation of systemic arterial pressure, cardiovascular disease and progressive renal dysfunction[xix]. Thus microalbuminuria is a sensitive marker for damage induced by diabetes[xx]. Proteinuria in patients represents a predictor of progressive renal impairment in all form of glomerulonephritis[xxi].Some studies stated that the presence of microalbuminuria in early stage of essential hypertension can be taken as an important predictor for progression of renal disease[xxii]. Microalbuminuria reflects vascular damage and appears to be a marker of early arterial disease[xxiii].

CONCLUSION

The prevalence of microalbuminuria among patients with essential hypertension was 59% and was associated with higher blood pressure values. Available tests for screening microalbuminuria are sensitive, reliable and accessible. Prevalence of microalbuminuria in hypertensive patients suggests that screening for microalbuminuria is essential for intervention and prevention of further complications like end stage renal disease and cardiovascular disease and it is essential to screen for early nephropathy by testing microalbuminuria in hypertensive patients prevent or halt the earliest stages of damage

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