



STUDY OF MICROALBUMINURIA IN PATIENTS WITH NORMOGLYCEMIC HYPERTENSION

Medicine

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ABSTRACT

INTRODUCTION: Hypertension is one of the most important risk factors for cardiovascular disease. The incidence of microalbuminuria is more common among hypertensive patients, even in nondiabetic patients. Microalbuminuria is an independent predictor of cardiovascular morbidity and mortality in patients with essential hypertension. Therefore, current guidelines recommend routine screening of microalbuminuria in hypertensive patients to ensure appropriate interventions are initiated early in the disease process before progression to chronic kidney disease and/or renal failure.

AIMS & OBJECTIVES: This study is done to estimate the prevalence of microalbuminuria in patients with normoglycemic hypertension and to identify other variables associated with it.

MATERIAL & METHODS: In this study, we randomly selected 100 patients with essential hypertension based on inclusion and exclusion criteria. CBC, renal function test, 24-hour urine albumin excretion (UAE), Body mass index (BMI), and arterial blood pressure measurement were done among all selected patients. Data entry was done in Microsoft Office Excel and analysis was done using the software package Epi Info (Version 7.1.5) from CDC, Atlanta, U.S.A.

OBSERVATIONS & RESULTS: The study was conducted among 100 hypertensive patients out of which 74 were male and 24 were female. Out of 100 patients, microalbuminuria was present in 44 patients. Mean arterial pressure was found high among patients with microalbuminuria than patients without microalbuminuria. The presence of microalbumin in urine was found to increase with the increasing severity of hypertension. Mean body mass index and serum creatinine were found higher in the microalbuminuric group than the normoalbuminuric group.

CONCLUSION: The incidence of microalbuminuria is more common among hypertensive patients, even in nondiabetic patients. The presence of microalbuminuria is an independent predictor of cardiovascular morbidity and mortality in patients with essential hypertension. Screening for microalbuminuria is a relatively simple process, should facilitate early vascular disease detection.

KEYWORDS

Microalbuminuria, Hypertension, Mean arterial pressure.

INTRODUCTION

Non-communicable diseases (NCDs) like hypertension, diabetes, coronary artery diseases, etc. are rapidly progressing globally and they are one of the leading causes of morbidity worldwide.⁽¹⁾ In the year 2015, Non-Communicable Diseases (NCDs) were responsible for 39 million (70%) of the total 56 million deaths in the world. Out of this, 2.4% of deaths were due to hypertensive heart disease. India shares more than two-thirds of the total deaths due to NCDs in the South-East Asia Region (SEAR) of WHO.⁽²⁾

Hypertension is one of the most important risk factors for cardiovascular disease. The association of hypertension with elevated levels of urinary albumin excretion is well established. Microalbuminuria is defined as a urinary albumin/creatinine ratio (UACR) higher than the threshold value obtained from studies assessing the risk for developing nephropathy in diabetes patients. The incidence of microalbuminuria is more common among hypertensive patients, even in nondiabetic patients. Several epidemiologic studies also have shown that the presence of proteinuria or microalbuminuria is an independent predictor of cardiovascular morbidity and mortality in patients with essential hypertension.⁽³⁻⁵⁾

Because microalbuminuria precedes the appearance of hypertension and diabetes and independently predicts CVD risk,⁽⁶⁾ screening for UAE, a relatively simple process, should facilitate early vascular disease detection. Therefore, current guidelines recommend routine screening of microalbuminuria in hypertensive patients to ensure appropriate interventions are initiated early in the disease process before progression to chronic kidney disease and/or renal failure. With concern to the above literature present study was conducted to estimate the prevalence of microalbuminuria in normoglycemic hypertension and to identify other variables related to it.

OBJECTIVES

1. To estimate the prevalence of microalbuminuria in patients with normoglycemic hypertension
2. To identify other variable associated with microalbuminuria and normoglycemic hypertension

MATERIAL & METHODOLOGY

This cross-sectional study was conducted at the Department of Medicine, C. U. Shah medical college & hospital, Surendranagar during the period of January 2019 to March 2020. In this study, we randomly selected 100 patients of essential hypertension attending medicine OPD based on inclusion and exclusion criteria. Ethical approval was taken from Institute's ethical committee and written informed consent was taken from patients. We have included patients having hypertension and on regular or irregular medicine. We excluded patients with impaired glucose tolerance, diabetes mellitus, chronic kidney disease, chronic heart disease, and urinary tract infection. Renal cause for hypertension was excluded by finding normal urinalysis, serum electrolytes, serum creatinine, and creatinine clearance. Patients with impaired glucose tolerance and diabetes mellitus were excluded by estimating HbA1c.

CBC, renal function test, 24-hour urine albumin excretion (UAE), Body mass index (BMI), and arterial blood pressure measurement (average of three consecutive measurements taken over a 15 min period) were done among all selected patients. Microalbuminuria was defined as UAE between 30 – 300 mg/24 hours.⁽⁷⁾

According to JNC – 8 guidelines, hypertensive patients are classified as grade 1 hypertension (SBP 140-159 mmHg or DBP 90-99 mmHg) and grade 2 hypertension (SBP $\geq$ 160 or DBP $\geq$ 100).⁽⁸⁾ Data entry was done in Microsoft Office Excel and analysis was done using the software package Epi Info (Version 7.1.5) from CDC, Atlanta, U.S.A.

RESULTS

1. Age and sex-wise distribution of study population

Age Group	Male	Female	Total
31-40 years	6	1	7
41-50 years	22	6	28
51-60 years	29	11	40
61-70 Years	16	8	24
>70 years	1	0	1
Total	74	26	100

In the present study, 74% of patients were male and 26% were female. The mean age of patients was 54.9 years $\pm$ 7.8 SD. Maximum numbers, 40% of patients belonged to the age group of 51-60 years followed by 28% and 24% in the age group of 41- 50 years and 61-70 years respectively.

2. Association of microalbuminuria with the severity of blood pressure (N=100)

Hypertension	Microalbuminuria		Total
	Present	Absent	
Grade 1	6 (19.4%)	25(80%)	31(100%)
Grade 2	38(55.1%)	31(44.9%)	69(100%)
Total	44(44%)	56(56%)	100(100%)
$\chi^2 = 11.7$, df = 1, p = 0.001			

Prevalence of microalbuminuria was found more among grade 2 hypertensive (55.1%) than grade 1 hypertensive (19.4 %) patients. On applying the statistical test, the difference in prevalence among both groups was found statistically significant (p<0.05). It shows that the presence of microalbumin in urine is increasing with the increasing severity of hypertension.

3. Association of microalbuminuria with Mean Arterial Pressure (MAP) (N=100)

Blood Pressure (mmHg)	Microalbuminuria		P Value
	Present (n=44)	Absent(n=56)	
Systolic blood pressure	167.3 $\pm$ 11.04	161 $\pm$ 12.6	0.011
Diastolic blood pressure	106 $\pm$ 7.4	101.5 $\pm$ 7.9	0.001
Mean Arterial Pressure	126.8 $\pm$ 7.7	121.3 $\pm$ 8.9	0.002
t=3.239, df=98, P = 0.002			

Mean systolic and diastolic blood pressure was found more among microalbuminuric patients than the normoalbuminuric group. The difference was found statistically significant (p<0.05). Mean Arterial Pressure (MAP) was found higher among microalbuminuric patients than normoalbuminuric patients. The difference in mean among both groups was found statistically significant (p<0.05).

4. Association of microalbuminuria with BMI and serum creatinine of the patient (N=100)

	Microalbuminuria		P-value
	Present (n=44)	Absent (n=56)	
Body mass Index (BMI)	25.3 $\pm$ 3.6	23.8 $\pm$ 3.0	0.03
Serum Creatinine	0.98 $\pm$ 0.18	0.84 $\pm$ 0.16	<0.0005

The mean body mass index was found higher in the microalbuminuric group (25.3 $\pm$ 3.6) than the normoalbuminuric group (23.8 $\pm$ 3.0). The difference of mean among both groups was found statistically significant (P<0.05). As shown in the above table, average S. Creatinine was higher in patients with microalbuminuria (0.98 $\pm$ 0.1) than patients without microalbuminuria (0.84 $\pm$ 0.16). On applying statistical test difference among mean found statistically significant.

DISCUSSION

Essential hypertension produces clinical proteinuria and a significant reduction in renal function. Microalbuminuria is an independent predictor of cardiovascular morbidity and mortality in patients with essential hypertension. Microalbuminuria can be defined as a persistent, increased urinary excretion of albumin. Screening for Urinary Albumin Excretion (UAE), a relatively simple process, should facilitate early vascular disease detection.

Many studies have shown the positive association of microalbuminuria in essential hypertensive patients with the severity of hypertension and also with systolic blood pressure and pulse pressure. So, the present study, "Study of microalbuminuria in patients with normoglycemic hypertension", was conducted to estimate the prevalence of microalbuminuria in normoglycemic hypertension and to identify other variables related to it at C. U. Shah Medical College and Hospital, Surendranagar. The study was conducted among 100 hypertensive patients out of which 74 were male and 24 were female. Out of 100 patients, microalbuminuria was present in 44 patients. Among 56 patients, urine albumin excretion was found < 30 mg in 24-hour sample.

Parving *et al.* in 1974 were the first to report microalbuminuria in hypertensive patients without diabetes. ⁽⁹⁾ Several studies have found an overall prevalence of around 6%–47%.

The high prevalence of microalbuminuria among patients with hypertension must raise an alarm amongst health professionals about the rising subclinical chronic kidney diseases (CKD). Indian study by Hitha *et al.* and Jalal *et al.* have found a prevalence of 26% and 37.5% in patients with hypertension respectively. ⁽¹⁰⁻¹¹⁾ Another study in India by Agrawal *et al.* found the prevalence of 47% among hypertensive ⁽¹²⁾; Maggon, *et al.* found the same prevalence (44%) as the present study. ⁽¹³⁾ Bigazziet *et al.* measured UAE in 123 patients of essential hypertension and 110 normal individuals. In their study, 40% of patients with essential hypertension showed UAE in the microalbuminuric range while none of the normal individuals had MA. ⁽⁵⁾

In our study, the mean systolic blood pressure among patients was 163.8 $\pm$ 12.3mmHg. Mean diastolic pressure was 103.7 $\pm$ 8.1mmHg. Mean arterial pressure among study subjects found 123.7 $\pm$ 8.8 mmHg. Mean systolic blood pressure, diastolic blood pressure, as well as mean arterial pressure (MAP), found higher among microalbuminuric patients than normoalbuminuric patients. Patients with microalbuminuria had significantly higher mean systolic blood pressure (SBP) than those without microalbuminuria in the study conducted by Magoon *et al.* ⁽¹³⁾ Mimran *et al.* and Jalal *et al.* also observed higher values of systolic arterial pressure in patients with MA than those without MA. ^(10,13,14)

Prevalence of microalbuminuria was found more among grade 2 hypertensive (55.1%) than grade 1 hypertensive (19.4 %) patients. On applying statistical test difference in prevalence among both groups found statistically significant.

Jalal *et al.* noticed increasing trends in UAE in normal, mild, and moderately hypertensive patients. ⁽¹⁰⁾ Another large-scale study also concluded that the prevalence of microalbuminuria increases with the increasing severity of hypertension. ⁽¹⁵⁾

In the present study mean BMI of all patients was 24.4 $\pm$ 3.3. Body mass index ranged from a minimum of 18.4 to a maximum of 32.0 among all patients.

Mean body mass index was found higher in the microalbuminuric group than the normoalbuminuric group. High BMI among hypertensive is at high risk of micro- albuminuria. Hillage *et al.* also supported this fact. ⁽¹⁶⁾

The serum concentration of creatinine of all patients was 0.91 $\pm$ 0.19 mg/ dl. Jalal *et al.* found serum creatinine 0.95 $\pm$ 0.17 mg/dl among hypertensive patients.

Average serum creatinine was higher in patients with microalbuminuria (0.98 $\pm$ 0.1) than patients without microalbuminuria (0.84 $\pm$ 0.16). In contrast to the present study difference in Serum creatinine among both groups was not found statistically significant in the study conducted by Radhakrishnan *et al.* ⁽⁴⁾

CONCLUSION

Among all hypertensive, microalbuminuria was present in 44% of patients. Mean arterial pressure was found high among patients with microalbuminuria than patients without microalbuminuria. Systolic and diastolic blood pressure was also found high among patients with microalbuminuria than patients without microalbuminuria. Among all hypertensive, more patients are at grade 2 (69%) of hypertension. The presence of microalbumin in urine was found to increase with the increasing severity of hypertension. Mean body mass index and serum creatinine were found higher in the microalbuminuric group than the normoalbuminuric group. So, routine screening of microalbuminuria in hypertensive patients recommended ensuring appropriate interventions are initiated early in the disease process before progression to chronic kidney disease and/or renal failure.

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