Original Research Article

Study of risk factors of microalbuminuria in hypertensive patients

Sandeep[1], Renuprasad[2*]

[1]Assistant Professor, MNR Medical College, Sangareddy, Telangana, INDIA.
[2]Sr. Resident, ESIC Medical College, Gulbarga, Karnataka, INDIA.
Email: renu1987mc@gmail.com, sandeep.rangdal@gmail.com

Abstract

Background: In hypertensive subjects, microalbuminuria has now been considered as an essential component in the assessment of subclinical organ damage. Various risk factors such as hypertension and obesity are associated with microalbuminuria. **Aim:** To know the prevalence of microalbuminuria as well as associated risk factors in hypertensive patients. **Material and Methods:** A total of 31 study cases and 31 controls cases were included andwere screened for albuminuria by using turbidimetric immunoassay. Anthropometric measurements and blood pressures were taken. **Results:** The height was significantly ($p<0.05$) lower among the cases (147.43±5.48) compared to controls (172.61±5.23). The weight was significantly higher among the cases (65.71±9.86) compared to controls (56.26±4.12). BMI was also observed to be significantly ($p<0.05$) higher among the cases (31.12±5.46) than controls (26.24±2.18). Systolic and diastolic blood pressure levels were found to be significantly higher among the cases compared to controls ($p<0.05$). **Conclusion:** BMI is associated as a risk factor with microalbuminuria in hypertensive patients. Our results indicated that systolic and diastolic BP and BMI were independently correlated with microalbuminura.

Key Words: Hypertension, Microalbuminuria, Body Mass Index, Urinary creatinine, Urinary microalbumin.

[*]**Address for Correspondence:**
Dr. Renuprasad, Sr. Resident, ESIC Medical College, Gulbarga, Karnataka, INDIA.
Email: renu1987mc@gmail.com

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INTRODUCTION

Hypertension is a major public health problem all over the world. The prevalence of hypertension is rapidly increasing in developing countries and is one of the leading causes of mortality and disability.[1] Microalbuminuria which represents albumin excretion rate (AER) of 30 to 300 mg/24 hours or 20- 200 micrograms/minute[2] or 30-299 mg/g creatinine[3] is defined as elevated urinary albumin excretion below the level of clinical albuminuria,[2] undetected by Albustix and can only be detected by special methods such as immunochemical[4] and is reversible with euglycaemic control. Microalbuminuria has emerged as a prognostic marker for cardiovascular disorders. The treatment aimed to reduce albuminuria levels have been shown to reduce the risk for cardiovascular events[5] as well as kidney disease progression.[6] In hypertensive subjects, microalbuminuria has now been considered as an essential component in the assessment of subclinical organ damage because its detection is easy and relatively inexpensive.[7] Various studies have documented risk factors such as hypertension, hyperglycemia, obesity and hyperlipidemia associated with microalbuminuria. This study was done to know the prevalence of microalbuminuria as well as associated risk factors in hypertensive patients.

MATERIAL AND METHODS

In this study, a total of 31 study cases and 31 controls cases were included andwere screened for albuminuria by using turbidimetric immunoassay.

Inclusion Criteria

1. Patients with hypertension (defined by sitting blood pressure (BP) ≥140/90 mmHg in those not previously diagnosed with hypertension)
2. Patients previously diagnosed with hypertension and reported current use of antihypertensive medications.
3. Non diabetics

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Exclusion Criteria

1. Known diabetic patients, alcoholics and smokers
2. Patients with fasting blood glucose ≥126 mg/dL
3. Patients with impaired kidney function (serum creatinine ≥1.4 mg/dL in male, or ≥1.2 mg/dL in female)
4. Patients with history associated with false positive albuminuria (fever, menstruation, urinary tract infection and post exercise).

Inclusion Criteria for Controls

1. Age group more than 30 years
2. Subjects diagnosed as a normal healthy person

Exclusion Criteria for Controls

1. Subjects suffering with any chronic diseases or acute infections
2. Alcoholic and smoker

All participants gave written informed consent. Detailed information including medical history, personal information, and Family history of the subjects was taken. This study was approved by Institutional ethical committee.

Method: Early morning urine samples were collected and screened for albuminuria by using turbidimetric immunoassay. Urine samples centrifuged at 2000 rpm for 3-5 minutes were used for quantitation of urine creatinine whereas the corresponding urine sample collected in sterile plastic urine container were sent for Pathology. An albumin/creatinine ratio ≥30 in a spot morning urine sample was considered microalbuminuria. After weight and height were measured, the body mass index (BMI) was calculated. Individuals with a BMI equal to or higher than 25 were considered over-weight and those with a BMI equal to or higher than 30 were considered obese. Waist circumference was measured and considered increased when higher than 80 cm for women or higher than 90 cm for men.

Biochemical Assessment

Urinary microalbimin by ImmunoTurbidimetry

Urinary creatinine by Jaffe's reaction

Joint National Committee VIII Hypertension diagnosis selection criteria[8]: Hypertension was categorized according to blood pressure readings by JNC-VIII definitions: Normal (systolic 33.9 mg albumin/ mmol creatinine as macroalbuminuria. The formula of Cockcroft and Gault equation was used to calculate estimated glomerular filtration rate (eGFR).[9] Calculation of eGFR in males-

eGFR = [140-age (yrs)] × weight (kg) × 88.4/ [72 × serum creatinine (μmol/L)]

Calculation of eGFR in women, based on their 15% lower muscle mass (on average)-

eGFR = [140-age (yrs)] × weight (kg) × 88.4 ×0.85/ [72 × serum creatinine (μmol/L)]

Statistical analysis: The collected data was entered and analyzed by using SPSS (Statistical Package for Social Sciences) version 11.0 for windows. The findings were expressed in terms of proportions or percentages.

RESULTS

The mean age of cases and controls was 48.52±9.64 and 50.16±8.82 years respectively. Majority of the cases (41.9%) and controls (48.3%) were between 41-50 years. There was no significant (p>0.05) difference in the age between cases and controls. [Table 1].

Table 1: Distribution of the cases and controls according to age group

Age (years)	Cases (n=31)		Controls (n=31)	
	No.	%	No.	%
31-40	8	25.8	9	29.0
41-50	13	41.9	15	48.3
51-60	6	19.3	4	12.9
>60	4	12.9	3	9.6
Mean ± SD	**48.52±9.64**		**50.16±8.82**	

Most of the cases i.e., 18 (58.1%) and controls 19 (61.3%) were females. There was no significant (p>0.05) difference in the sex between cases and controls showing comparability of the groups.

Table 2: Distribution of cases according to risk factors

Risk factors	Cases	Controls	p value	
Height (cm)	147.43±5.48	172.61±5.23	p<0.05	Significant
Weight (Kg)	65.71±9.86	56.26±4.12	p<0.05	Significant
BMI	31.12±5.46	26.24±2.18	p<0.05	Significant
Systolic BP	132.84±4.82	114.42±2.61	p<0.05	Significant
Diastolic BP	88.64±6.01	67.42±2.48	p<0.05	Significant

The height was significantly (p<0.05) lower among the cases (147.43±5.48) compared to controls (172.61±5.23). The weight was significantly higher among the cases (65.71±9.86) compared to controls (56.26±4.12). BMI was also observed to be significantly (p<0.05) higher among the cases (31.12±5.46) than controls (26.24±2.18). Systolic blood pressure levels were found to be significantly higher among the cases compared to controls (p<0.05). DBP comparison of the cases and controls according to Systolic blood pressure level were also found to be significantly higher among the cases compared to controls. The family history of hypertension was found to be significantly (p=0.01) higher among the cases 22 (70.9%) compared to controls 14 (45.1%).

Table 3: Comparison of the cases and controls according to Urinary microalbumin level

	Urinary micro albumin level (mg/mmol)	Urinary creatinine level (mg/dl)
Cases	34.1±7.46	1.24±0.68
Control	26.41±5.23	0.96±1.04
p value	<0.05 (Significant)	<0.05 (Significant)

Urinary micro albumin level and creatinine level were found to be significantly ($p<0.05$) higher among the cases compared to controls (Table 3).

DISCUSSION

The present study was conducted to know the prevalence of microalbuminuria as well as associated risk factors in hypertensive patients. The study was also done to evaluate the association of microalbuminuria in hypertensive patients and healthy subjects. There was no significant difference in the age and sex between the cases and controls in this study showing the comparability of the groups. Microalbuminuria is known to be a risk factor for cardiovascular disease; however, it is not known whether this association results from an effect of microalbuminuria in the development of subclinical atherosclerosis or whether microalbuminuria destabilizes subclinical atherosclerosis, thus leading to clinical events. Microalbuminuria in nondiabetic subjects might be part of insulin resistance syndrome.[10]The known components of insulin resistance syndrome (metabolic syndrome) such as hypertension, hyperglycemia, obesity, hyperlipidemiais associated with microalbuminuria and act as risk factors.[11] The prevalence of microalbuminuria in different populations with the same clinical condition varies significantly. A number of previous studies evaluated the prevalence of microalbuminuria in hypertensive patients has been published, which is varied from 14.4 to 26.2% in Asian populations.[12-14]This variability might be due to several factors such as the threshold used, measurement methods, instruments or extent of co-morbidities in the study population. In the present study, the BMI was observed to be significantly ($p<0.05$) higher among the cases (31.12±5.46) than controls (26.24±2.18). Tripathi SS *et al* also observed similar findings in their study.[15]Abdominal obesity represents a key component of the metabolic syndrome. Abdominal obesity which is associated with an accumulation of visceral fat tissue, acts as an important component of the metabolic syndrome and its associated complications.[16,17] In the present study, the urinary creatinine level was found to be significantly ($p=0.018$) higher among the study group (1.24±0.68) compared to controls (0.96±1.04). Hasit *et al* observed that the urinary albumin creatinine ratio was lesser than the established microalbuminuric range of 30-300 mg/g, in both study and controls irrespective of the values obtained for lipid profile and anthropometric indices.[18] To conclude, our study indicates that Microalbuminuria is a useful marker to assess risk management of renal and cardiac involvement by early screening of patients with hypertension for microalbuminuria. BMI is associated as a risk factor with microalbuminuria in hypertensive patients. We focused largely on BMI with the understanding that this is a modifiable risk factor. Our results indicated that systolic and diastolic BP and BMI were independently correlated with microalbuminura.

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