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A Study of Microalbuminuria in Non-Diabetic Hypertensive Patients of RIMS, Adilabad

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Original Research Article

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Abstract: Microalbuminuria is an important marker of generalized vascular damage and indicator of future cardiovascular complications in hypertensive patients. The amount of microalbuminuria indicates the extent of target organ damage. Early detection of microalbumin in urine may be helpful in the management of hypertension. Aim: The study was designed to determine the prevalence of microalbumin in non-diabetic hypertensive patients and comparison with controls. Methods: This study was performed in the Departments of General Medicine and Department of Biochemistry, Rajiv Gandhi Institute of Medical Sciences [RIMS] Adilabad. The Group A (n=50) was Hypertensive group those with elevated blood pressure reading in three subsequent visits to the hospital were included in the hypertensive group. The height and weight of all the participants were measured with standard equipment and the BMI was calculated. Blood pressure was examined by a standard mercury sphygmomanometer after 5 minutes of rest. Fasting blood samples will be collected in Vacutainer 10ml and serum fasting blood sugar, Serum Electrolytes and lipid profile will be estimated. Microalbumin was determined by immunoturbidimetric method were carried out using 'Beckman Coulter Au 400' auto analyzer. Results: The mean age of the hypertensive group was 47.5 ± 6.5 yrs and the mean age of the control group was 45 .5 ± 5.6 yrs. In the hypertensive group, 35 (70%) were male and 15 (30%) were female. In the control group, 38(76%) were male and 12 (24%) were female. The serum albumin was slightly lower in the hypertensive group although not significant. The serum urea concentration of the hypertensive group means values were 33.54 ± 6.54 mg/dl and the control group was 28.25 ± 8.94 mg/dl the p values were found to be significant. 19 (38%) of the patients in the hypertensive group were found to be with microalbuminuria and none of the control group was having microalbuminuria the 'p' values were found to be highly significant. Conclusion: Microalbuminuria is an important marker of cardiovascular morbidity and mortality including target organ end damage. In this study, 38% of patients were having microalbuminuria. A patient with increased age and greater duration of hypertension develop microalbuminuria frequently. Microalbumin detection should be done in all the hypertensive patients regularly to monitor control and prevent future complications.
Keywords: Microalbuminuria, Hypertensive patients.

INTRODUCTION

Hypertension is increasing in the population across the world and it is now becoming an important public health problem. A recent report on the global burden of hypertension has shown that nearly 1 billion adults had hypertension in the year 2000 and it is predicted to increase to 1.56 billion by 2025 [1]. It is also an established risk factor for myocardial infarction, stroke, and peripheral vascular disease. About 13.5% of all deaths are attributed to hypertension and it also suggests the in developing countries it is one of the leading causes of death and disability in the population [2]. The Jaipur heart study and the Chennai Urban Rural Epidemiology Study (CURES) reported the prevalence of hypertension to be 37% and 20% [2, 3]. Urinary albumin leakage is one of the manifestations of vascular damage [4]. Microalbuminuria is defined as excretion of 30 to 300 mg of albumin per day in urine and it is associated with increased risk of cardiovascular risk and renal damage [5]. Microalbuminuria in non-diabetic adults suggests that the vascular endothelium is not functioning properly. A diagnosis of microalbuminuria can be made by measuring its excretion rate during 24 hours or in an overnight urine collection, or by measuring albumin/creatinine ratio or albumin concentration in the morning or a random urine sample [6]. Increased albumin excretion rates in essential hypertension were first reported by Parving *et al.* [7] in

1974. Since then, the prevalence of microalbuminuria is estimated to be between 5% - 40% in essential hypertension [8-10]. The diagnosis of microalbuminuria at an early stage helps to take proper precaution and to initiate appropriate management in hypertensive subjects. Some studies have shown that lowering of albuminuria by using ACE/ARB was associated with better renal and cardiovascular outcome. In a study conducted by Dick de zeeuw *et al*. in 2006 the prevalence of microalbuminuria in patients with hypertension was 8–23 % in different cohorts [11]. These wide variabilities in the incidence of microalbuminuria in studies may be due to the severity of hypertension, racial profile of the subjects, and a number of patients studied [12] increased albumin excretion is one of the signs of target organ damage [13].

MATERIALS AND METHODS

This study was performed in the Departments of General Medicine and Department of Biochemistry, Rajiv Gandhi Institute of Medical Sciences [RIMS] Adilabad. Institutional Ethical committee clearance was obtained for the study. A written consent was obtained from all the participants of the study after explaining the nature of the study in the local language. A total of 100 participants were selected based on the inclusion and exclusion criteria and they were divided into two groups. The Group A (n=50) was Hypertensive group those with elevated blood pressure reading in three subsequent visits to the hospital were included in the hypertensive group. Those diagnosed recently with hypertension and on medication with antihypertensive drugs were also included in the study. Patients with other disorders like diabetes mellitus, renal diseases, thyroid disorders, secondary hypertension and other significant medical conditions were excluded from the study. Age and sex-matched controls without any significant medical conditions were included in the Group B [Control group] (n=50). The height and weight of all the participants were measured with standard equipment and the BMI was calculated. Blood pressure was examined by a standard mercury sphygmomanometer after 5 minutes of rest in the morning and the patients were advised not to have tea/coffee before the measurement of the blood pressure. The Cuff was placed on the right arm and sphygmomanometer was at the level of the heart. The appearance of the sounds was recorded as the Systolic pressure and muffled sounds were recorded as diastolic pressure. Three consecutive readings were taken and the mean of the three values was taken as the blood pressure. The Mean arterial pressure was calculated as DBP + 1/3rd Pulse pressure. All the participants were advised to continue their routine activity and regular diet without involving in any stressful activity on the day of urine collection. During the third OPD visit, the subject brought his/her previous 24-hour urine collection for estimation. All the measurements were made with Autoanalyzer. All the participants were advised to continue their routine activity and regular diet without involving in any stressful activity on the day of urine collection. During the third OPD visit, the subject brought his/her previous 24-hour urine collection for estimation. Fasting blood samples will be collected in Vacutainer 10ml and serum fasting blood sugar, Serum Electrolytes and lipid profile will be estimated in fully automatic chemistry analyzer Microalbumin was determined by immunoturbidimetric method were carried out using 'Beckman Coulter Au 400' microalbuminuria was defined as UAE between 30 – 300 mg/24 hours.

RESULTS

A total of 100 patients were enrolled for the study out of which 50 were hypertensive patients and 50 were age and sex-matched controls. Among the 50 hypertensive patients, 40 (80%) patients did not receive any medications prior to the study. The remaining 10 (20%) were diagnosed as hypertensive and receiving medications. The mean age of the hypertensive group was 47.5 ± 6.5 yrs and the mean age of the control group was 45 .5 ± 5.6 yrs. In the hypertensive group, 35 (70%) were male and 15 (30%) were female. In the control group, 38(76%) were male and 12 (24%) were female. The mean arterial pressure in hypertensive patients was 119.52 ± 6.65 mmHg as compared to 94.54 ± 4.2 mmHg in the control group. The mean SBP, DBP, and MAP were all significant compared to the normal controls (table 1).

Table-1: Showing the characteristics of the subjects involved in the study

Variable	Hypertension Group	Control Group	P values
Age group (yrs)	47.5 ± 6.5	45 .5 ± 5.6	>0.1
Sex M/F	35/15	38/12	>0.9
BMI Kg/m^2	28.25 ± 2.24	24.81 ± 2.52	>0.5
SBP mmHg	150.44 ± 10.59	125.7 ± 9.5	<0.05*
DBP mmHg	97.67 ± 5.4	82.2 ± 5.5	< 0.05*
MAP mmHg	119.52 ± 6.65	94.54 ± 4.2	<0.04*

The laboratory parameters of the participants in the study were measured. Serum cholesterol, uric acid, and creatinine were higher in the hypertensive group of the patients as compared to normal control group. The serum albumin was slightly lower in the hypertensive group although not significant. The serum urea concentration of the hypertensive group mean values were 33.54 ± 6.54 mg/dl and the control group

was 28.25 ± 8.94 mg/dl the 'p' values were found to be significant. The serum sodium was found to be higher in hypertensive group 142.65 ± 7.81 mmol/L as compared to the control group which was 138.65 ± 9.6 mmol/L the p values were not found to be significant. The serum sodium levels were found to be higher in hypertensive group 4.89 ± 0.37 mmol/L as compared to the control group 4.22 ± 0.64 mmol/L. The urine samples were collected for 24 hours from all the participants of the study. The urinary albumin excretions (mg/24 hr) was determined and mean values in the hypertensive group was 29.45 ± 6.64 mg/24 hr whereas it was 6.55 ± 0.41 mg/24Hr was in control group the 'p' values were found to be significant. 19 (38%) of the patients in the hypertensive group were found to be with microalbuminuria and none of the control group was having microalbuminuria the 'p' values were found to be highly significant (table 2). Microalbuminuria was seen more in patients with moderate hypertension.

Table-2: the Laboratory parameters in both groups of patients

Parameter	Hypertension Group	Control Group	P values
Blood glucose mg/dl	97.52 ± 2.58	94.28 ± 3.54	> 0.1
Serum cholesterol mg/dl	195.36 ± 12.65	188.67 ± 15.47	> 0.05
Serum uric acid mg/dl	5.01 ± 0.57	4.35 ± 1.75	> 0.1
Serum albumin mg/dl	4.17 ± 0.46	4.51 ± 0.53	>0.5
Serum urea mg/dl	33.54 ± 6.54	28.25 ± 8.94	<0.01*
Serum creatinine mg/dl	0.98 + 0.37	0.88 ± 0.34	<0.05
Serum sodium mmol/L	142.65 ± 7.81	138.65 ± 9.6	>0.33
Serum potassium mmol/L	4.89 ± 0.37	4.22 ± 0.64	<0.05*
Urinary albumin excretion (mg/24 hr.)	29.45 ± 6.64	6.55 ± 0.41	< 0.05*
Patients with microalbuminuria	19 (38%)	Nil	<0.001*

DISCUSSION

In the present study there were 100 patients they were divided into two groups one of the hypertensive group of 50 patients and another of control of 50 subjects. The minimum age in the hypertensive group was 38 yrs and maximum age was 71 years. The mean age was 47.5 ± 6.5 yrs. The minimum age in the control group was 35 years and the maximum age was 60 years. The mean SBP values in the hypertensive group were 150.44 ± 10.59 mmHg and DBP was 97.67 ± 5.4 mmHg. There has been an increased interest recently in quantitative measurements of microalbuminuria [MA] to detect the target organ damage. MA also predicts progression of diabetic neuropathy and is closely related to vascular diseases in diastolic dysfunctions, arterial hypertension and CHF [14, 15]. Studies have shown that the risk of cardiovascular events is increasing progressively with increasing levels of urine microalbumin [16] and the relationship of hypertension and microalbumin in urine is continuous and tends to increase with severity of hypertension [17]. In the present study, the presence of microalbumin in urine was seen in 38% of the patients with essential hypertension. In a similar study by Bhom *et al*. in 2007 showed a higher prevalence of microalbumin in urine (68%) [18]. The reason could be changed in the inclusion criteria whereas that we included newly detected hypertensive patients. Anil Kumar *et al.* [19] found microalbumin in 32% of patients similar to the results of our study. In south India, a study by Hitha *et al*. in 2008 found [20] found prevalence of microalbuminuria in 26.6% of the patients. S Jalal *et al*. [12] found the prevalence of 37.5% in Kashmir. Apart from the presence of microalbuminuria in hypertensive patients the present study also found a higher prevalence of Urea, creatinine and lower levels of serum potassium in hypertensive patients as compared to the normal control group. S Jalal *et al*. also found the elevated levels of serum urea, creatinine in the hypertensive subjects but the values were in the normal range and not significant [12]. In this, the study the elevated values of urea, creatinine, and potassium levels were all found to be significant. The serum total cholesterol was also measured in the present study it was found to be elevated in the hypertensive group as compared to the normal group but the levels were not found to be significant. Alejandro D *et al.* [21] found higher levels of Cholesterol and lower HDL-C in patients with essential hypertension. The presence of metabolic variations in the patients with hypertension may indicate possible insulin resistance in the development of microalbuminuria in essential hypertension. We in the present study found the BMI values were higher in hypertensive patients. It has been reported by Pedrinelli R that higher BMI is associated with hypertension and microalbuminuria [22]. Some studies have also found no correlation between BMI and albumin excretion [23]. From the above, it can be concluded there is a strong case for the screening of Microalbumin in urine in patients with hypertension especially those with higher levels of BMI.

CONCLUSION

Microalbuminuria is an important marker of cardiovascular morbidity and mortality including target organ end damage. In this study, 38% of patients were having microalbuminuria. A patient with increased age

and greater duration of hypertension develop microalbuminuria frequently. Microalbumin detection should be done in all the hypertensive patients regularly to monitor control and prevent future complications.

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