Original Article

Assessment of Microalbuminuria Levels in Hypertensive Patients

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ABSTRACT

Objective: To evaluate association of microalbuminuria levels with severity of hypertension

Study Design: Cross-Sectional

Place and Duration: This study was conducted at department of Physiology Basic Medical Sciences Institute in collaboration with Medical ward-7 of Jinnah Post-Graduate Medical Centre, Karachi from January 10, 2005 to June 20, 2005.

Subjects and Methods: This study was conducted on 60 subjects classified into following groups. Thirty healthy normal volunteers were studied as control group, (group A). Thirty hypertensive patients included in (group B), were subdivided into B-l (mild hypertensive, Systolic Blood Pressure 140-159mmHg / Diastolic BP 90-99mmHg) and B-2 (moderate hypertensive, SBP 160-179 mmHg / DBP 100-109 mmHg). These sub-groups consisted of 15 subjects each. The parameters included the SBP, DBP, and Mean Arterial Pressure, urinary albumin excretion. Clinical details were collected and 24 hours urinary collection in the container from all the selected subjects were received in the next morning.

Results: Analysis of results revealed excretion of albumin to be 55.96 ±10.8 µg/min in group B (hypertensive), in comparison to 14.18 ±0.59 in control group. While in the subgroups of group B, we observed the mean values of urinary albumin excretion 48.93 ±11.72 in subgroup B-l (mild hypertensive), and 63.00 ±18.38 in subgroup B-2 (moderate hypertensive).

Conclusion: Our study concluded that increased levels of microalbuminuria are associated with the increasing intensity of hypertension. Early detection of risk factors and timely intervention may ensure a longer and healthier life.

Key words: Microalbuminuria, Hypertension, Mean Arterial Pressure.

INTRODUCTION

The association between microalbuminuria and hypertension was established long time ago.[1] In some guidelines, the measurement of microalbuminuria is recommended for risk stratification in people with hypertension.[2] Blood pressure and microalbuminuria are closely interlinked although the controversy persists as to whether microalbuminuria heralds the rise in blood pressure or increases in blood pressure leads to kidney damage hence paving way for microalbuminuria.[3] In hypertension and diabetes, microalbuminuria is an important indicator of vascular damage.[4] Microalbuminuria has been associated with an adverse atherogenic risk profile and a higher prevalence of cardiovascular disease.[5] Microalbuminuria and peripheral arterial disease may be markers of generalized atherosclerosis.[6] Microalbuminuria has been related to endothelial damage/dysfunction. Endothelial cells release both relaxing and contracting factors that modulate vascular smooth muscle tone and also participate in the pathophysiology of essential hypertension.[7] Urinary albumin excretion in some patients with essential hypertension is due to increased glomerular hydrostatic or increased permselectivity of the glomerular basement membrane.[8] Endothelial dysfunction could cause albuminuria both directly, by increasing glomerular pressure and glomerular basement membrane permeability, and indirectly, by influencing mesangial cell and podocyte function in a paracrine fashion (e.g. through inflammatory mechanisms).[9]

Proteinuria is usually an indicator of increased glomerular permeability to normally non-filtered plasma macromolecules such as albumin. In this condition the protein excretion usually exceeds 300-500mg/day. A 24-hour urine collection showing the presence of more than 150 mg of protein is abnormal. A urine dipstick test if constantly positive for protein is an important indicator of proteinuria.[10]

Microalbuminuria is a specific, integrated marker of cardiovascular risk and target organ damage in primary

hypertension and one that is suitable for identifying patients at higher global risk.[11] A considerable indication of cardiovascular and renal risks in both diabetic and non-diabetic cases is microalbuminuria. Evaluation of urinary albumin excretion is increasing in hypertensive patients which in turn is proving to be helpful in assessing the risk factors and planning out preventative strategies. Thus the key to a better understanding of the role of microalbuminuria assessment in hypertensive management is the knowledge of determinants of microalbuminuria.[12]

MATERIALS AND METHODS

This study was carried out in the Department of Physiology, Basic Medical Sciences Institute in collaboration with Medical Unit-III (Ward-7), Jinnah Postgraduate Medical Centre, Karachi. A total of 60 subjects, who consented to participate, were included in this study. The subjects below 55 years of age not suffering from severe hypertension and diabetes mellitus were recruited in the study. Those fulfilling inclusion criteria were invited for second visit to bring 24 hours urinary collection in container provided to them. Measurement of urinary volume, albumin concentration (by colorimetric test Pyrogallol-Red) and creatinine concentration were performed. The study participants were divided into the following groups:

Group A - Normotensive (N=30)

Group B - Hypertensive (N=30)

• B-l - Mild Hypertension (Systolic BP 140-159mmHg / Diastolic BP 90-99mmHg)

• B-2 - Moderate Hypertension (Systolic BP 160-179 mmHg / Diastolic BP 100-109 mmHg)

RESULTS

The mean ages of group A, B-1 and B-2 were 48, 53 and 51 years respectively.

The mean value of systolic blood pressure noted in control group was 120.66 ±1.82, while in group B-l it was 154 ±1.21, and 172.066 ±0.95 in group B-2. The mean value of diastolic blood pressure as noted was 79.16 ±1.92 in control group, 96 ±0.87 in group B-l, 108 ±0.65 in group B-2 (shown in table 1). In control group, excretion of albumin was noted to be 14.8 ±0.59 ug/min, while we found 48.93 ±11.72ug/min in group B-l, 63.00 ±18.38ug/min in group B-2 (shown in table 2).

DISCUSSION

This study was conducted on subjects having mild to moderate hypertension and compared with normal healthy subjects. Basic idea is the fact that hypertension has shown to be coincided with increased albuminuria. Our results have endorsed the fact that the increased severity of hypertension tend to increase degree of microalbuminuria.

Table-1: Comparison of systolic blood pressure, diastolic blood pressure and mean arterial pressure of control with Hypertensive subgroups on the basis of severity of Hypertension

Variables	Group A (Control) (n=30)	Group B-1 Mild Hypertension (n=15)	Group B-2 Moderate Hypertension (n=15)
Systolic Blood Pressure (mmHg)	120.66 ±1.82	154.00 ±1.21	172.66 ±0.95
Diastolic Blood Pressure (mmHg)	79.16 ±1.92	96.00 ±0.87	108.00 ±0.65
Mean Arterial Pressure (mmHg)	93.16 ±1.72	114.66 ±0.92	129.88 ±0.61

Table-2: Comparison of urinary albumin excretion rate of subgroups of hypertensive patients on the basis severity of hypertension with control group

Variables	Group A (Control) (n=30)	Group B-1 Mild Hypertension (n=15)	Group B-2 Moderate Hypertension (n=15)
Urinary Albumin (mg/l)	18.97 ±0.97	47.26 ±10.22	56.4 ±15.00
Urinary Albumin Excretion Rate (µg/min)	14.81 ±0.597	48.93 ±11.72	63.00 ±18.38

The association between microalbumin excretion and risk factors of Ischemic Heart Diseases has also been observed by other workers.[13] These results are in accordance with other studies regarding hypertensive subjects, who have exhibited increased levels of microalbuminuria.[14]

An other study[15] compared 24-hour urinary albumin excretion in a group of normotensive, borderline, and untreated mild hypertertensive and assessed the possible relation between microalbuminuria and arterial blood pressure. Higher values of microalbuminuria were observed in the mild hypertensive as compared to the other two groups. Present study is in agreement with these observations; as our data also suggested that the albumin excretion had significantly increased with increasing severity of hypertension. We found 48.93

±11.72µg/min in group B-1 (mild hypertension), 63.00 ±18.38µg/min in group B-2 (moderate hypertension) as compared to 14.81 ±0.59 µg/min in control group.

CONCLUSION

Our study concluded that increased levels of microalbuminuria are associated with the increasing intensity of hypertension. Early detection of risk factors and timely intervention may ensure a longer and healthier life.

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