

Occurrence of microalbuminuria and hypertensive retinopathy in patients with essential hypertension

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Abstract

Background: Microalbuminuria is frequently seen in patients with established essential hypertension, and is a predictor of a higher risk for cardiovascular and probably renal dysfunction. The present study was conducted to assess microalbuminuria in patients with essential hypertension. **Materials & Methods:** 80 patients with essential hypertension of both genders were recruited and assessed for microalbuminuria was measured in a 24 hours urinary sample. **Results:** Out of 80 patients, males were 52 and females were 28. Out of 80 patients, microalbuminuria was present in 20 patients. Age group 30-40 years had 0, 40-50 years had 1, 50-60 years had 7 and >60 years had 12 patients. 35 patients had no retinopathy. 20 had grade I, 14 had grade III and 9 had grade IV. MA was seen in 5 having no retinopathy, 4 in grade I, 6 in grade II, 3 in grade III and 2 in grade IV. The difference was significant ($P < 0.05$). **Conclusion:** The prevalence of microalbuminuria was high among patients of essential hypertension. Grad II retinopathy patients had high prevalence of microalbuminuria.

Keywords: Microalbuminuria, hypertension, Retinopathy

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Introduction

Microalbuminuria is frequently seen in patients with established essential hypertension, and is a predictor of a higher risk for cardiovascular and probably renal dysfunction. The presence of microalbuminuria has been shown to correlate with the other cardiovascular risk factors commonly seen in hypertensive patients[1]. This fact indicates that the detection of an increased urinary albumin excretion could probably be the best index of an increased global cardiovascular risk in a given patient. Blood pressure control is accompanied by a fall in the content of albumin in urine[2]. Hypertension (HT) is a growing public health problem and it is now being widely reported in many rural and urban parts as one of the commonest cause of morbidity and mortality[3]. The reasons for this growing burden are multiple, ranging from socio-economic changes and genetic influence. At a genetic level, there is growing evidence showing an association between elevated diastolic BP and CaMK affecting endothelial functions like controlling vascular resistance hence increasing the risk of HT[4]. Many patients with essential hypertension may present with overt or sub-clinical target organ damage (TOD) involving the heart, kidneys, central nervous system or retina at the time of their initial diagnosis[5].

The cost effectiveness of BP reduction using drug therapy is greater in the presence of target organ abnormalities and/or co-morbidities. In this context, assessment of sub-clinical TOD has become the key element in evaluating hypertensive patients[6]. The present study was conducted to assess microalbuminuria in patients with essential hypertension.

Materials & Methods

The present study was conducted among 80 patients with essential hypertension of both genders. All patients were informed and their written consent was obtained.

Demographic data of each patient was recorded. Microalbuminuria was measured in a 24 hours urinary sample. Blood urea, serum creatinine, fasting and random blood sugar, serum electrolytes—sodium and potassium, serum uric acid, serum calcium and phosphate, lipid profile, x-ray chest and electrocardiography was recorded. The BP was measured, using the auscultatory method with a standardized calibrated mercury column-type sphygmomanometer. Two separate measurements were recorded at five-minutes intervals and the average of the two values was taken. Results thus obtained were statistically analysed. P value less than 0.05 was considered significant.

Results

Table 1; Distribution of patients

| Total- 80 | | |
|-----------|------|--------|
| Gender | Male | Female |
| Number | 52 | 28 |

Table I shows that out of 80 patients, males were 52 and females were 28.

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Table 2: Prevalence of microalbuminuria in different age groups

| Age groups (Years) | Total | Prevalence | P value |
|--------------------|-------|------------|---------|
| 30-40 | 5 | 0 | 0.02 |
| 40-50 | 16 | 1 | |
| 50-60 | 24 | 7 | |
| >60 | 35 | 12 | |

Table II, graph I shows that out of 80 patients, microalbuminuria was present in 20 patients. Age group 30-40 years had 0, 40-50 years had 1, 50-60 years had 7 and >60 years had 12 patients. The difference was significant (P< 0.05).

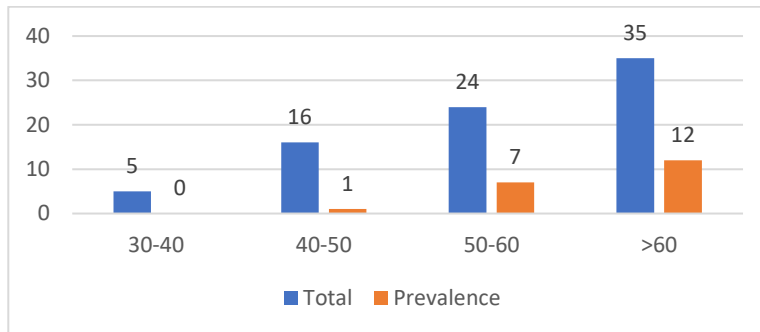


Fig 1: Microalbuminuria in different age groups

Table 3: Microalbuminuria (MA) and various stages of hypertensive retinopathy

| Stages | Number | Microalbuminuria | P value |
|----------------|--------|------------------|---------|
| No retinopathy | 35 | 5 | 0.05 |
| Grade I | 20 | 4 | |
| Grade II | 14 | 6 | |
| Grade III | 12 | 3 | |
| Grade IV | 9 | 2 | |

Table 3, Fig 2 shows that 35 patients had no retinopathy. 20 had grade I, 14 had grade III and 9 had grade IV. MA was seen in 5 having no retinopathy, 4 in grade I, 6 in grade II, 3 in grade III and 2 in grade IV. The difference was significant (P< 0.05).

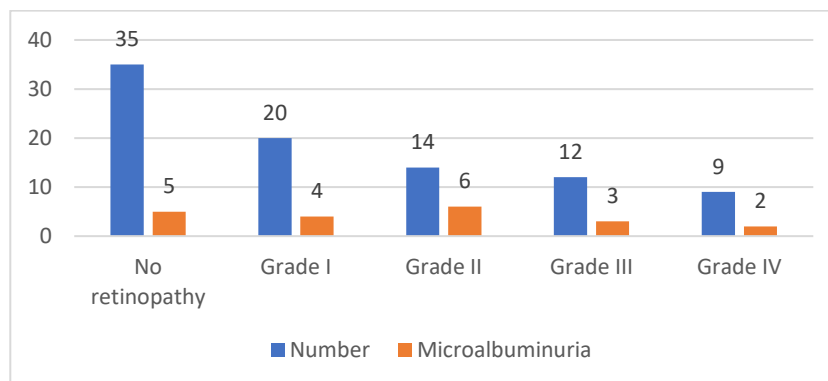


Fig 2: Microalbuminuria (MA) and various stages of hypertensive retinopathy

Discussion

Hypertension is a disorder of circulatory regulation. Sustained hypertension causes accelerated atherosclerosis with consequent coronary heart disease (CHD), heart failure, and stroke and renal failure. If untreated, approximately 50% of patients develop heart disease, 33% develop stroke, and 10%–15% develop renal failure[7]. The JNC 7 report states that high blood pressure is the number one attributable risk for death in the world. Uncontrolled hypertension is directly associated with end organ damages including CHD, CHF, LVH, stroke, and peripheral vascular disease. Little data is available among Indian patients regarding significance of microalbuminuria (MA) in context of hypertension and future cardiovascular morbidity[8]. The present study was conducted to assess microalbuminuria in patients with essential hypertension. In present study out of 80 patients, males were 52 and females were 28. Hitha et al [9] found out the prevalence of MA and its relationship to TOD in patients with

essential hypertension. A total of 150 hypertensives without diabetes mellitus and/or other conditions causing MA were studied. Forty patients (26.67%) were found to have MA of whom 24 were males and 16 were females. MA was significantly higher in those with longer duration and greater severity of hypertension (p <0.001 in each). Older age (p <0.001), adverse lipid profile (p <0.01) and higher BMI (p <0.04) were the other identifiable risk factors for MA. Gender and history of smoking did not pose higher risk for MA. Stroke (OR=3.8), echocardiography-proven LVH (OR=9.42) and hypertensive retinopathy (OR=9.7) were significantly higher in those with MA. In conclusion, the prevalence of MA in essential hypertension is high and patients with MA have high odds for developing TOD like stroke, LVH and hypertensive retinopathy. Early screening of hypertensives for MA and prompt treatment of positive cases might reduce the burden of CKD and cardiovascular disease in the community.

We found that out of 80 patients, microalbuminuria was present in 20 patients. Age group 30-40 years had 0, 40-50 years had 1, 50-60 years had 7 and >60 years had 12 patients. Parving et al[10] determined the prevalence of microalbuminuria, LVH in patients with microalbuminuria and the correlation between microalbuminuria and LVH among newly diagnosed black adult hypertensive patients attending a large outpatient hypertension. The mean age/standard deviation of the study participants was 54.3 ± 6.2 years with a female predominance (162, 63.3%). The prevalence of microalbuminuria among newly diagnosed hypertensive patients was 39.5 %. The prevalence of LVH among patients with microalbuminuria was found to be 17 %.

There was a positive correlation between microalbuminuria and left ventricular hypertrophy among the newly diagnosed adult hypertensive patients. We found that 35 patients had no retinopathy. 20 had grade I, 14 had grade III and 9 had grade IV. MA was seen in 5 having no retinopathy, 4 in grade I, 6 in grade II, 3 in grade III and 2 in grade IV. Increased UAE could be the consequence of an augmented intraglomerular capillary pressure, it could reflect the existence of intrinsic glomerular damage that causes changes in glomerular barrier filtration, or it could be the consequence of a tubular alteration that impedes the normal reabsorption of filtered albumin[11]. However, it has been suggested that microalbuminuria may represent the renal manifestation of generalized, genetically-conditioned vascular endothelial dysfunction that may underlie the link between an increased UAE and an elevated risk for cardiovascular disease. In this sense, it has been described that microalbuminuria is associated with a decreased size- and charge-selectivity of the glomerular vessel wall in clinically healthy subjects, and is an independent marker of systemic transvascular albumin leakiness[12].

Conclusion

Authors found the prevalence of microalbuminuria was high among patients of essential hypertension. Grad II retinopathy patients had high prevalence of microalbuminuria.

References

- Stein JH, Korcarz CE, Hurst RT, Lonn E, Kendall CB, Mohler ER, et al. Use of carotid ultrasound to identify subclinical vascular disease and evaluate cardiovascular disease risk: A consensus statement from the American Society of Echocardiography Carotid Intima-Media Thickness Task Force. Endorsed by the Society for Vascular Medicine. *J Am Soc Echocardiogr* 2008;21:93-111.
- Kaplan NM; Systemic hypertension; Mechanism and diagnosis, in Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine 7th ed. Zipes DP, Libby P, Bonow R, and Braunwald E, editos. Philadelphia, PA; Elsevier Saunders; 2004. p. 967.
- Koren MJ, Devereux RB, Casale PN, Savage DD, Laragh JH. Relation of left ventricular mass and geometry to morbidity and mortality in uncomplicated essential hypertension. *Ann Intern Med* 1991; 114: 345-52.
- Verdecchia P, Ciucci A, Battistelli M, Bartocchini C, et al. Adverse prognostic significance of concentric remodeling of the left ventricle in hypertensive patients with normal left ventricular mass. *J Am Coll Cardiol* 1995;25:871-8.
- Bianchi S, Bigazzi R, Campese VM. Microalbuminuria in essential hypertension: Significance, pathophysiology, and therapeutic implications. *Am J Kidney Dis* 1999; 34: 973-95.
- Devereux RB, Alonso DR, Lutas EM, Gottlieb GJ, Campo E, Sachs I, et al. Echocardiographic assessment of left ventricular hypertrophy: Comparison to necropsy findings. *Am J Cardiol* 1986;57:450-8.
- Rita Rani Maggon, Rupali Malik, Neelima Jain, HS Isser. Study of the Prevalence of Microalbuminuria in Patients of Essential Hypertension and Its Correlation with Left Ventricular Hypertrophy and Carotid Artery Intima-media Thickness. *J Clin Prev Cardiol* 2018;7:11-6.
- Juliet Nabbaale, Davis Kibirige, Emmanuel Ssekasanvu, Elias S Sebatta, James Kayima, Peter Lwabi, Robert Kalyesubula. Microalbuminuria and left ventricular hypertrophy among newly diagnosed black African hypertensive patients: a cross sectional study from a tertiary hospital Uganda. *BMC Research Notes* 2015; 8: 198.
- Hitha B, Ramakrishna CD, Jayaprakash K, et al. Microalbuminuria in patients with essential hypertension and its relationship to target organ damage: An Indian experience. *Saudi J Kidney Dis Transpl* 2008; 19: 411-9.
- Parving HH, Lehnert H, BrochnerMortensen J, Gomis R, Andersen S, Arner P. Irbesartan in Patients with Type 2 Diabetes and Microalbuminuria Study Group. The effect of Irbesartan on the development of diabetic nephropathy in patients with type 2 diabetes. *N Engl J Med* 2001; 345: 870-8
- Arnold Forelemu, Alain Menanga, Gloria Ashuntatang, Samuel Kingue. Urinary Protein Excretion is associated with left ventricular hypertrophy in treatment – naive hypertensive patients in an African hospital setting. *Cardiorenal Med.* 2013; 3: 57-62.
- Levy D, Savage DD, Garrison RJ, Anderson KM, Kannel WB, Castelli WP. Echocardiographic criteria for left ventricular hypertrophy: The Framingham Heart Study. *Am J Cardiol* 1987;59:956-60.

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