



## ORIGINAL RESEARCH PAPER

Medicine

**MICROALBUMINURIA IN STROKE:  
OCCURRENCE OF MICROALBUMINURIA AS AN  
INDEPENDENT RISK FACTOR FOR STROKE AND ITS  
RELATION WITH PATIENT PROFILE**

KEY WORDS: .

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**INTRODUCTION**

Microalbuminuria is a well-known early marker of diabetic nephropathy. Recently microalbuminuria has been considered a marker of cardiovascular events. Studies have clearly demonstrated microalbuminuria among patients with CAD. According to HOPE study – microalbuminuria is associated with increased adverse cardiovascular events (RR 1.83), all cause mortality (RR 2.09) and hospitalization for CCF (RR 3.23). EPIC Norfolk study suggested that microalbuminuria is associated with 50% increase in stroke incidence in general population. The present study attempts to look for prevalence of microalbuminuria in patients with stroke independent of known cause of microalbuminuria like hypertension and diabetes. Thus microalbuminuria could serve to be a bedside tool which might serve as a surrogate marker of endothelial dysfunction resulting from various causes. Most importantly microalbuminuria is known to regress with lifestyle modifications and therapeutic interventions. This may further pave way for better targeted lifestyle modifications therapeutic interventions.

**AIMS AND OBJECTIVES**

1. To look for any increased prevalence of microalbuminuria among patients with stroke, its relation with type and severity of stroke
2. To look for any demonstrable relation with patient profile

**MATERIALS AND METHODS**

This is a hospital based case control study. 60 cases and 61 controls were selected from among patients attending medical wards of Medical College, Kozhikode. Cases included those admitted with a recent cerebrovascular accident. Those patients with other diseases causing microalbuminuria except hypertension and diabetes mellitus and those with macroalbuminuria were excluded from the study. Early morning spot sample of urine was used to assess microalbuminuria by immunoturbidimetry and was estimated as mg/gm creatinine.

**RESULTS**

The study population included 121 patients with a mean age of 58.83 (age range 28-85 years). The case and control groups were comparable in terms of age, sex and known risk factors like hypertension and diabetes. The majority in the stroke group were aged > 60 years but included 9 patients in the young stroke category. 53.3% of the stroke group had microalbuminuria compared to 26.4 % among controls. Microalbuminuria was significantly different even when analysis was done excluding those with diabetes and hypertension. This showed significant relation with increasing age, but no significant difference between bleeds and infarcts. Relation between diabetes, hypertension and microalbuminuria was demonstrable only in the control population. Risk factors like hypercholesterolemia, smoking, alcoholism, diet and nature of occupation had no demonstrable relation with microalbuminuria in the present study group.

**CONCLUSIONS**

1. Microalbuminuria is independently associated with stroke without any significant difference between intracranial bleeds and infarcts.
2. Hypertension and diabetes was found to have significant relation with microalbuminuria but the relation was obscured in the presence of stroke.
3. Microalbuminuria showed a significant relationship with

increasing age and was more prevalent among smokers but not at statistically significant levels.

**DISCUSSION**

There is a close relation between atherosclerosis, endothelial dysfunction (ED) and leakage of protein through glomerulus. ED can be considered when endothelial properties have changed in a way that is inappropriate with regard to the preservation of organ function. In ED most potent endogenous vasodilator, Nitric oxide production or its activity, is hampered which leads to arterial vasoconstriction. This causes increase arterial as well as glomerular pressure and permeability. In ED, glomerular basement membrane loses its normal negative charges ED also causes loss of surface heparin like proteoglycan molecules that prevent thrombus formation and smooth muscle growth thus promoting thrombus formation and intimal thickening which enhance atherosclerosis. So in ED both MA and atherosclerosis are found. Most of the acute ischemic stroke happened due to atherosclerosis by sudden occlusion of the lumen developed by the superimposed thrombosis or hemorrhage into atheroma. Microalbuminuria and atherosclerosis found in ED is manifested as increased intima-media thickness of common carotid arteries. Measurement of urinary microalbumin may be one of the most important screening tests for determining the risk of atherosclerotic disease as well as those who are prone to develop ischemic stroke.

**References:**

1. Diercks GF, Van Boven AJ, Hillege HL, Janssen WM, Kors JA, De Jong PE, Grobbee DE, Crijs HJ, Van Gilst WH. Microalbuminuria is independently associated with ischaemic electrocardiographic abnormalities in a large non-diabetic population. The PREVEND (Prevention of Renal and Vascular Endstage Disease) study. *European heart journal*. 2000 Dec 1;21(23):1922-7.
2. Venkat KK. Proteinuria and Microalbuminuria in Adults: Significance, Evaluation, and Treatment. *Southern Medical Journal*. 2004 Oct 1;97(10):969-79.
3. Stehouwer CD, Smulders YM. Microalbuminuria and risk for cardiovascular disease: analysis of potential mechanisms. *Journal of the American Society of Nephrology*. 2006 Aug 1;17(8):2106-11.
4. de Zeeuw D, Parving HH, Henning RH. Microalbuminuria as an early marker for cardiovascular disease. *Journal of the American Society of Nephrology*. 2006 Aug 1;17(8):2100-5.
5. Gerstein HC, Mann JF, Yi Q, Zinman B, Dinneen SF, Hoogwerf B, Hallé JP, Young J, Rashkow A, Joyce C, Nawaz S. Albuminuria and risk of cardiovascular events, death, and heart failure in diabetic and nondiabetic individuals. *Jama*. 2001 Jul 25;286(4):421-6.
6. Yuyun MF, Khaw KT, Luben R, Welch A, Bingham S, Day NE, Wareham NJ. Microalbuminuria independently predicts all-cause and cardiovascular mortality in a British population: The European Prospective Investigation into Cancer in Norfolk (EPIC-Norfolk) population study. *International Journal of Epidemiology*. 2004 Feb 1;33(1):189-98.
7. Beamer NB, Coull BM, Clark WM, Wynn M. Microalbuminuria in ischemic stroke. *Archives of neurology*. 1999 Jun 1;56(6):699-702.
8. de Jong PE, Curhan GC. Screening, monitoring, and treatment of albuminuria: Public health perspectives. *Journal of the American Society of Nephrology*. 2006 Aug 1;17(8):2120-6.
9. Ninomiya T, Perkovic V, Verdon C, Barzi F, Cass A, Gallagher M, Jardine M, Anderson C, Chalmers J, Craig JC, Huxley R. Proteinuria and stroke: a meta-analysis of cohort studies. *Am J Kidney Dis*. 2009;53: 417-425
10. Higgins JPT, Green S. *Cochrane Handbook for Systematic Reviews of Interventions*. Oxford, UK: The Cochrane Collaboration; 2008.