

## Prevalence of proteinuria in rural adult population in Tamil Nadu

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**Background & objectives:** Presence of proteinuria is considered as an early marker of an increased risk of progressive kidney disease. Angiotensin converting enzyme (ACE) inhibitors (ACEi) and angiotensin II receptor blockers (ARB) treatment to persons with proteinuria and chronic kidney disease has been shown to decrease the progression to endstage renal disease. As the exact prevalence of proteinuria is not known in the general population, we undertook this study to estimate the same in a rural adult population in Vellore district, Tamil Nadu.

**Methods:** A convenient sample of 5043 adults was included. All individuals were tested for albuminuria by albumin dipstick examination in an untimed urine sample. Individuals who tested positive for albuminuria underwent a second dipstick examination after a gap of one week. Individuals with persistent albuminuria on the second dipstick examination underwent further evaluation which included medical history, physical examination, 24 h urine protein estimation, total serum protein and albumin estimation. Ultrasound of the abdomen was done in patients with renal failure and renal biopsy was performed in selected patients.

**Results:** Of the total 5043 individuals screened, 63.1 per cent were females. Mean age of the study population was  $50.94 \pm 11.2$  yr. First dipstick test identified 594 individuals positive for albuminuria. Repeat dipstick could be done in only 576, of whom 212 showed persistent albuminuria. Significant proteinuria was detected in 24 individuals of the 208 who had 24 h urine protein measured. Of these 24 patients, 3 were found to have chronic renal failure, 12 were presumed to have diabetic nephropathy clinically, one each had focal segmental glomerulosclerosis and biopsy proven diabetic nephropathy, and 7 patients had proteinuria of unknown aetiology.

**Interpretation & conclusion:** The prevalence of proteinuria in this adult rural population was 0.47 per cent (0.30-0.67%). The detection and treatment of chronic kidney disease in 24 individuals is bound to reduce the rate of decline of renal functions. Screening programme for proteinuria in different parts of country may be an effective measure to bring a decline in rate of progression of chronic kidney disease in general population.

**Key words** Albuminuria - dipstick - endstage renal disease - proteinuria

Urinary protein excretion in healthy persons averages 60-80 mg with the upper limit of 150 mg/day<sup>1-3</sup>. Current evidence indicates that the presence of proteinuria is an early marker of an increased risk of progressive kidney disease, poor cardiovascular outcome and death<sup>4,5</sup>. Among the various predictors of progression of chronic kidney disease to end stage renal disease (ESRD), proteinuria is the most potent predictor<sup>6</sup>. Angiotensin converting enzyme (ACE) inhibitors (ACEi) and angiotensin II receptor blockers (ARB) have been given to persons with proteinuria and chronic kidney disease to decrease the progression to end stage renal disease<sup>4,7-11</sup>, treatment of proteinuric patients with ACEi and ARB has been shown to decrease the rate of progression of chronic kidney disease.

In the developing resource - poor countries including India, most patients cannot afford treatment of ESRD by renal replacement therapy. Since the exact prevalence and cause of proteinuria as a marker of kidney disease is not known in our population, we undertook this study to estimate the same in a rural population in Tamil Nadu.

### Material & Methods

A convenient sample of 5043 adults (aged 40 yr and above) from rural area of Kaniyambadi block of Vellore district in Tamil Nadu State of India was included in the study. Since it was a preliminary study, a fixed sample size of 5000 was taken. The study was carried out for a period of 22 months between March 2003 and January 2005. Individuals were selected under an ongoing community health programme by the Department of Community Medicine, Christian Medical College & Hospital (CMCH), Vellore in this area.

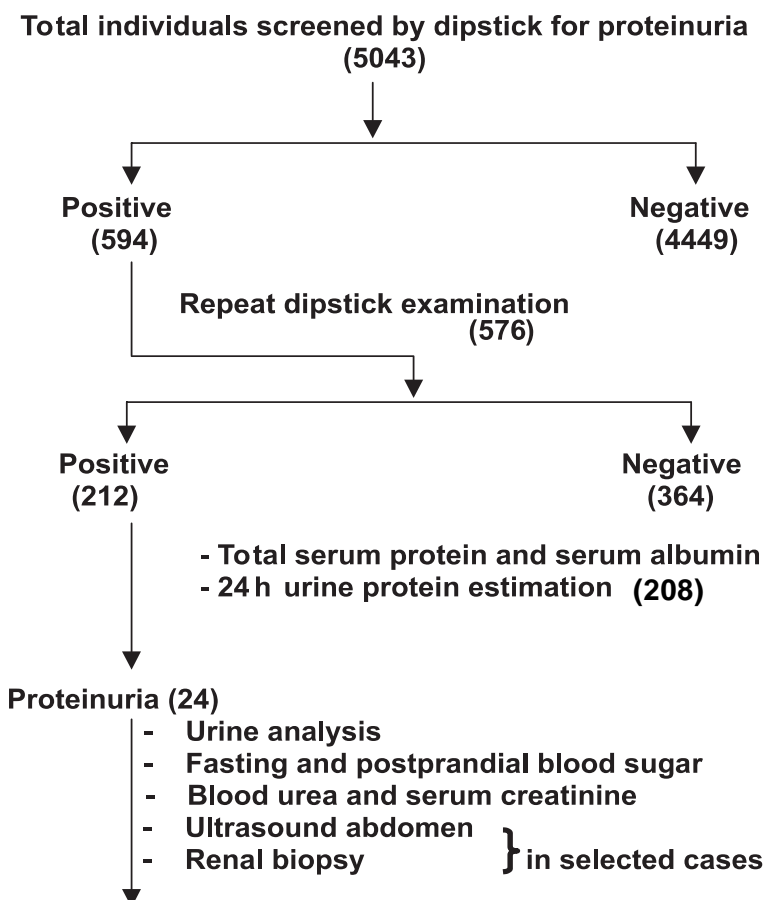
After explaining about the objective of the study, individuals were tested for albuminuria by dipstick

examination (Multistix SG, Bayer Diagnostics India Ltd, India) in an untimed urine sample. Individuals who had acute illness, non ambulatory persons and menstruating women were excluded. Individuals tested positive for albuminuria underwent a second dipstick examination after a gap of one week. Repeat dipstick was performed to rule out transient proteinuria.

Individuals with persistent albuminuria on the second dipstick examination underwent further evaluation at CMCH, Vellore which included medical history, physical examination, 24 h urine protein estimation, total serum protein and albumin estimation. Those who had proteinuria (protein excretion >150 mg/day on 24 h urine protein estimation) underwent urine microscopic examination, blood urea and serum creatinine, fasting and postprandial blood sugar level estimations. Ultrasound of the abdomen was done in patients with renal failure (serum creatinine >1.4 mg/dl). Renal biopsy was performed in patients with proteinuria >1 g/day or proteinuria with an active urinary sediment or with renal failure. To facilitate the participation, dipstick examination for albuminuria was performed at the individual's residence.

### Results & Discussion

Of a total of 5043 individuals screened, 3180 (63.1%) were women. The age ranged from 40 to 100 yr with a mean age of  $50.94 \pm 11.2$  yr. First dipstick test identified 594 individuals with positive for albuminuria. Of these, repeat dipstick could be done in 576 individuals of whom 212 showed persistent albuminuria (Fig.). Significant proteinuria was detected in 24 (14 males, 10 females) of the 208 individuals with persistent albuminuria who had 24 h urine protein measured. Further evaluation of these 24 subjects revealed chronic renal failure in three by biochemical and ultrasound examinations. Twelve patients were presumed to have diabetic



**- Clinically diabetic nephropathy (12), Unexplained proteinuria (7), Chronic renal failure (3), Biopsy proven focal segmental glomerulosclerosis (1), Biopsy proven diabetic nephropathy (1)**

**Fig.** Flow chart showing the design of the study. Positivity means trace or more than trace positivity for albuminuria.

nephropathy clinically (diabetics with proteinuria, diabetic retinopathy and inactive urinary sediment). Seven patients who had proteinuria of unknown aetiology, were not subjected to renal biopsy as criteria for biopsy were not met (proteinuria of less than 1 g/day, normal renal function and bland urinary sediment). Two patients underwent renal biopsy and it showed focal segmental glomerulosclerosis in one and diabetic nephropathy in the other (Fig.).

The prevalence of proteinuria in the study population was 0.47 per cent (0.30-0.67%) using albumin dipstick as a screening test. Prevalence in males and females was 0.75 per cent (0.35-1.14%) and 0.31 per cent (0.11-0.50%) respectively (Table).

The female preponderance in the study sample was probably a reflection of the fact that the men were away from home at work during the time of sample collection. Among the various aetiological factors, diabetic nephropathy was found in 13 of 24 patients (54%) with proteinuria.

Seven patients with significant proteinuria not meeting the criteria for a renal biopsy are being followed up. Patients with diabetic nephropathy were advised euglycaemic measures and are on follow up with the community health department. One individual with focal segmental glomerulosclerosis was treated with ACEi and has stable renal function.

**Table.** Prevalence rate of proteinuria (%) according to age and gender

Age (yr)	Males		Females	
	(N)	Prevalence	(N)	Prevalence
40-59	1155	0.60 (0.58 - 0.62)	2090	0.62 (0.61 - 0.64)
60-79	639	0.32 (0.30 - 0.34)	991	0.35 (0.347 - 0.349)
≥80	69	0.07 (0.06 - 0.09)	99	0.03 (0.027 - 0.029)
Total	1863		3180	

Values in parentheses indicate range

In conclusion, although the prevalence of proteinuria in this rural population was low, detection and treatment of chronic kidney disease in 24 individuals with proteinuria is likely to reduce the rate of decline of renal function. Similar screening programmes for proteinuria with proper study design in different parts of the country may prove to be an effective measure in reducing the burden of chronic kidney disease.

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