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Original Article

Screening for Microalbuminuria in the General Population of Tirana, a Tool to Detect Subjects at Risk for Progressive Renal Failure in an Early Phase

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Abstract

Background. We conducted a cross-sectional study in Tirana, the capital of Albania, in 2005-2006 which aimed to examine the relationship between urinary albumin excretion (UAE) and other risk factors in the general population.
Methods. The sample consisted of 807 individuals: 210 men (26%), 597 women (74%). Overall mean age was 37.6 ± 11.3 years. All participants were invited to undergo urine and blood tests, physical examination and a short interview. For each individual, albuminuria was measured with dipstick and based on the values of urinary albumin excretion (UAE: mg/24h), participants were classified into 4 groups: 0 to 15 (normal), 15 to 30 (high-normal albuminuria [HNA]), 30 to 300 (MA), and >300 (macroalbuminuria).
Results. The prevalence of proteinuria for each group was respectively 69.5% (561 subjects), 19.3% (156 subjects), 9.3% (75 subjects) and 1.9% (15 subjects). There was evidence of a positive correlation of proteinuria with both diastolic and systolic blood pressure, which was statistically significant for the third grade of proteiuria and partly for the second grade. Furthermore, there was evidence of positive correlations of proteinuria with body mass index and total cholesterol level for the third and the fourth grade. Conversely, there was no correlation with glicemia.
Conclusion. Our findings indicate that screening for microalbuminuria may be a useful tool, either alone or in combination with screening for hypertension and hypercholesterolaemia, to identify subjects at risk for progressive renal failure. Dipstick urinalysis is a simple, noninvasive test for the detection of proteinuria, often a marker of unsuspected chronic renal disease.

Keywords: End-stage renal failure; general population; microalbuminuria; screening, urinary albumin excretion

Introduction

Chronic kidney diseases (CKD) are now in pandemic proportions and are one of the causes of morbidity and mortality worldwide. The global prevalence of CKD is rapidly increasing, particularly in the developing world, mainly due to changing patterns of disease from intrinsic renal disease to systemic diseases that damage the kidney, such as diabetes, predominantly type II, hypertension and generalized atherosclerosis [1]. CKD has a complex interrelationship with cardiovascular diseases. There is an inverse relationship between initial renal function and subsequent risk of death and complications from c-v disease [2]. Same correlation as, diabetes and impaired glucose intolerance are also risk factors for renal disease and cardiovascular disease. Unfortunately, most of these patients are referred to the nephrologists only at a time when renal function is close to the level where dialysis is required, that is when not much can be expected of conservative renoprotective treatments [3].
Therefore, it is imperative for screening and prevention programs to detect and then treat people with kidney disease as well those with diabetes, hypertension, and cardiovascular disease. Albuminuria is a known risk factor for progression of renal disease. In addition it's also risk factor for cardiovascular events in pts with diabetes or kidney disease [4].
However, the relevance of urinary albumin excretion as a risk indicator in the general population is controversial.
The aim of this study was to early identify the subjects from general population with risk to develop CKD and to examine the relationship between urinary albumin excretion (UAE) and other risk factors in the general population such as age, systolic blood pressure (SBP) and diastolic blood pressure (DBP), total cholesterol, glomerular filtration rate (GFR), glicemia and body mass index (BMI).

Patients and methods

Study design: a cross-sectional study was carried out in 2005-2006 in Tirana, Albania.

Study population: sampling was conducted based on population lists provided by the National Institute of Statistics in Tirana, the capital city of Albania. Sampling frame consisted of all individuals (both men and women) residing in Tirana aged 25-55 years. Based on the population lists, we drew an age- and sex-stratified sample of 1000 individuals (70% women, 30% men) in selected age-groups (25-35 years: 250 women and 100 men; 36-45 years: 225 women and 100 men; 46-55 years: 225 women and 100 men). Of 1000 individuals targeted for recruitment, 83 (8.3%) could not be located, whereas 61 (6.1%) refused to participate. A further 49 individuals were partially examined, but did not provide information on several covariates and, therefore, were excluded from the analysis. The final study population

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consisted of 807 individuals: 210 men (26%), 597 women (74%). Overall mean age was 37.6 ± 11.3 years.

Data collection: all participants were invited to undergo urine and blood tests, physical examination (measurement of blood pressure, weight and height) and a short interview. For each individual, albuminuria was measured with dipstick and based on the values of UAE (mg/24h), participants were classified into 4 groups: 0 to 15 (normal), 15 to 30 (high-normal albuminuria [HNA]), 30 to 300 (MA), and >300 (macroalbuminuria). We used analytic strip Bayer 10 SG. The dipstick procedures were conducted by trained laboratory technicians at the University Hospital Center in Tirana. GFR was estimated using Cockroft-Gault formula. Definition of hypertension was based on values of both systolic and diastolic blood pressure (Joint National Comity 7). Analysis included data on socio-demographic and socioeconomic factors and other major risk factors for CKD including body mass index.
The study was approved by the Albanian Committee of Medical Ethics. Participants gave written consent after being informed about the aim and procedures of the study.

Statistical analysis: the prevalence of albuminuria and 95% confidence intervals (CIs) were estimated. Pearson's correlation coefficients of microalbuminura with hypertension were calculated and statistical significance was tested.

Results

All examined patients were divided into the following groups according to levels of proteinuria: 1-Gr (normal), 2-Gr (15-30 mg), 3-Gr (31-300mg) and 4-Gr >300mg. The prevalence of proteinuria for each group was respectively 69.5% (561 subjects), 19.3% (156 subjects), 9.3% (75 subjects) and 1.9% (15 subjects). The overall prevalence of proteinuria is presented in Table 1. Almost 70% of participants (N=561) exhibited normal values of proteinuria, whereas 2% (N=15) displayed values of more than 300 mg.

Table 1. Prevalence of proteinuria (mg/24h) in a representative sample of Albanian adults (N=807)

Proteinuria	Number	Percentage
1-Gr (normal)	561	69.5%
2-Gr (15-30 mg)	156	19.3%
3-Gr (31-300mg)	75	9.3%
4-Gr (>300mg)	15	1.9%
Total	**807**	**100%**

Correlations of proteinuria with systolic and diastolic blood pressure, body mass index, total cholesterol level and glicemia are presented in Table 2. There was evidence of a positive correlation of proteinuria with both diastolic and systolic blood pressure, which was statistically significant for the third grade of proteinuria and partly for the second grade. It must be noted that the number of individuals in the fourth group (>300 mg/24h) was rather small (N=15) and, therefore, results were not statistically significant notwithstanding the strength of the correlation coefficients with either systolic blood pressure (r = 0.38) or diastolic blood pressure (r = 0.41). Furthermore, there was evidence of positive correlations of proteinuria with body mass index and total cholesterol level for the third and the fourth grade. Conversely, there was no correlation with glicemia (Table 2).

Table 2. Correlations of proteinuria with selected risk factors for chronic kidney disease

Variable	Proteinuria			
	1-Gr (normal)	2-Gr (15-30 mg)	3-Gr (31-300mg)	4-Gr (>300mg)
Systolic blood pressure	0.18 (0.46)*	0.26 (0.17)	0.32 (0.01)	0.38 (0.13)
Diastolic blood pressure	0.21 (0.13)	0.31 (0.01)	0.28 (0.03)	0.41 (0.11)
Body Mass Index	0.07 (0.52)	0.13 (0.32)	0.27 (0.06)	0.34 (0.04)
Total cholesterol	0.12 (0.71)	0.18 (0.22)	0.27 (0.19)	0.39 (0.09)
Glicemia	0.08 (0.67)	0.14 (0.54)	0.09 (0.34)	0.16 (0.23)

* Correlation coefficients and p-values (in parenthesis)

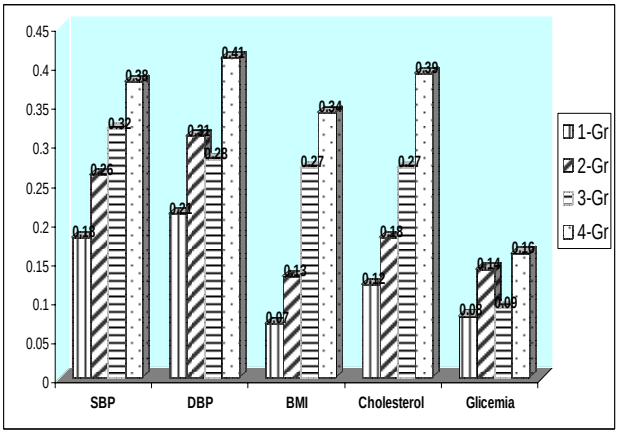

Fig. 1. Correlations of proteinuria with selected risk factors for chronic kidney disease

Discussion

It is now more than 40 years since Keen *et al*. had reported an increase in urinary albumin excretion in "newly detected hyperglycemics". The term microalbuminuria, however, first appeared in the medical literature in 19801, by Viberti and Svensen, to describe UAE below the detection limits of a standard dipstick [5]. In diabetes it has been shown clearly that subjects with microalbuminuria have an enhanced risk of developing progressive renal failure compared with subjects with a normal albumin excretion [6]. The same can be concluded for essential hypertension. Bigazzi *et al*. [7] showed that the fall in GFR in patients with essential hypertension over a mean follow-up period of 7 years was greater in those with microalbuminuria at the start than in those with a normal albumin excretion at the start.

Recently was showed that microalbuminuria occurs frequently even in the general population, in subjects without diabetes and hypertension. Moreover, there is evidence that, as in diabetes, already modestly increased levels of albumin excretion are associated with a decreased GFR in patients with essential hypertension and in non-diabetic non-hypertensive subjects [8]. Finally, micro-albuminuria is associated with an enhanced risk for cardiovascular mortality and probably also with an enhanced risk for progressive renal failure not only in diabetic patients but also in hypertensive and in non-diabetic, non-hypertensive subjects [9]. In addition, the use of UAE as a screening tool is made more feasible by more sensitive assays that are more commercially available and that appear to be reliable even in the lower ranges [10]. Ironically, patients with chronic renal failure and persistent proteinuria may remain minimally symptomatic until renal function is severely impaired, with the eventual need for end-stage renal disease (ESRD) management (dialysis or transplantation).

We found at general population a significant correlation of microalbuminuria (Table 1) with both systolic and diastolic blood pressure, a significant correlation with Total Cholesterol, a correlation with Glicemia and BMI (Table 2) in a representative sample of adults in Tirana (Albania), a transitional country in Southeast Europe, these data are comparable with Prevend, Okinava. Our findings suggest that subclinical abnormalities in the kidneys or vascular endothelium may precede the progression of kidney damage. Based on these results, treatment of albuminuria in individuals may offer a cost-effective benefit to prevent cardiovascular and renal disease.

Conclusion

This large prospective cohort study, in Tirana (Albania), leads us to conclude that screening for microalbuminuria may be an excellent tool, either alone or in combination with screening for hypertension and hypercholesterolaemia, to identify subjects at risk for progressive renal failure. Dipstick urinalysis is a simple, noninvasive test for the detection of proteinuria, often a marker of unsuspected chronic renal disease (other analyses available on multiple dipstick urine tests are not considered in this study).

Conflict of interest statement. None declared.

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