

Factors of cardiovascular risk in patients with type 2 diabetes and incipient nephropathy

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Abstract

Background: Microalbuminuria was originally established as a predictor of renal failure and an independent risk factor for cardiovascular disease in patients with diabetes mellitus as well as in general population. The aim of our study is to assess the relationship between microalbuminuria and the other risk factors in diabetics and their prevalence.

Methods: Sixty five patients, 22 men and 43 women with mean age 58.6 ± 10.09 , with type 2 diabetes, were hospitalized in the Department of Internal Medicine in the University Hospital Center "Mother Teresa" in Tirana, Albania, between March 2007 and February 2008. These patients with a mean duration of diabetes 6.09 ± 5.41 were divided in two groups: with (Group A: 24 patients) and without (Group B: 41 patients) microalbuminuria and each group was evaluated for left ventricular mass index (LVMI), body mass index (BMI), glycosylated hemoglobin (HbA1C), lipid profile and intima media thickness (IMT).

Results: The prevalence of microalbuminuria in our study was 32.3%. The prevalence of microalbuminuria in males was 37.5 and in females 62.5%. The microalbuminuric patients were older (59.71 ± 9.87 vs 57.07 ± 10.32) and had a longer duration of diabetes (7.74 ± 5.74 vs 4.45 ± 5.08) compared with normoalbuminuric patients ($p=0.01$). The Group A had significantly higher LVMI compared with Group B ($p=0.02$). The prevalence of obesity ($BMI > 30 \text{ kg/m}^2$) in our sample was 44.6%. In Group A the mean BMI (30.13 ± 4.98) was significantly higher compared with Group B (28.00 ± 3.72 , $p=0.04$). Diabetic retinopathy was more frequent in Group A compared with Group B (33.3% vs 14.6%, $p=0.05$). The mean value of IMT was higher in Group A compared with Group B (1.28 ± 0.35 vs 1.09 ± 0.28 , $p=0.03$).

Conclusion: In patients with type 2 diabetes and microalbuminuria LVMI, IMT, BMI, duration of diabetes was significantly higher compared with patients with type 2 diabetes and normoalbuminuria. Hippokratia 2008; 12 (4): 221-224

Key words: microalbuminuria, type 2 diabetes, cardiovascular risk, nephropathy

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The global prevalence of diabetes mellitus (DM) is predicted to rise from 135 million in 1995 to 330 million by 2025¹. Type 2 diabetes is an independent risk factor for microvascular and macrovascular disease²⁻⁴. Diabetic nephropathy in patients with type 2 diabetes has a cumulative prevalence of 30-40 % and is currently the leading cause of end stage renal disease (ESRD)^{5,6}. The early clinical evidence of nephropathy is the appearance of low but abnormal levels (30-300 mg/day) of albumin in the urine, referred to as microalbuminuria, and patients with microalbuminuria are referred to as having incipient nephropathy. Microalbuminuria was originally established as a predictor of renal failure in patients with diabetes mellitus^{7,8}. Microalbuminuria has become a prognostic marker for cardiovascular disease (CVD) and the finding of microalbuminuria is an indication for screening for possible vascular disease and aggressive intervention to reduce all cardiovascular risk factors^{9,10}. Epidemiological and experimental data show that microalbuminuria is associated with an increased risk for all-cause and cardio-

vascular mortality, cardiac abnormalities, cerebrovascular disease, and, possibly, peripheral arterial disease^{11,12}. So, it seems to correlate with various cardiac abnormalities and diseases, including echocardiographic measures of LVMI¹³⁻¹⁵. Cerebrovascular clinical correlates with microalbuminuria include increased carotid artery intima-media thickness¹⁶. Endothelial function and chronic inflammation have been suggested as possible candidates to explain the associations between microalbuminuria and CVD^{2,17}.

The objective of the present cross-sectional study was to determine the prevalence of microalbuminuria and associated risk factors among type 2 diabetic patients.

Material and methods

The study group comprised of 65 type 2 diabetic patients hospitalized at the Department of Internal Medicine. Patients with presence of urinary tract infection, macroalbuminuria, renal failure or heart failure of any stage were excluded. The patients were divided in two groups: Group A with and group B without microalbuminuria.

minuria. The clinical data were obtained from the patient's history. BMI was calculated and expressed as kg/m². Patients were characterized as hypertensives if their blood pressure was higher than 120/75mmHg or if they were receiving antihypertensive treatment. Blood pressure was measured with the use of a validated mercury sphygmomanometer. A fasting blood sample was drawn after 10 hour overnight fasting and the following investigations were done: plasma glucose, HbA1c, lipid profile and serum creatinine. For microalbuminuria, spot urine samples were collected in the early morning and microalbuminuria was defined as, a urinary albumin excretion between 30 and 300 mg/l per day. The ocular fundi, for possible retinopathy, were examined by a specialist, by direct ophthalmoscopy. Common carotid artery IMT was measured by a B-mode ultrasound, 10 MHz transducer.

Two-dimensional echocardiograms of the left ventricle (LV) were performed. End-diastolic measurements of interventricular septal thickness (IVS), LV (LVED), and posterior wall thickness (PWT) were carried out in accordance with the American Society of Echocardiography recommendations. The left ventricular mass (LVM) was calculated by the formula introduced by Devereux and Reichek and was indexed for body surface area to obtain LVMI. Left ventricular hypertrophy was diagnosed when LVMI was >134 g/m² in men and >110 g/m² in women.

Statistics

Statistical analysis was done using SPSS version 7.5. Differences in parameters of interest between groups were sought by the U Mann Whitney test. For comparison of qualitative variables Fisher's exact test and Student's test for quantitative variables was used. Statistical significance was assumed if $p < 0.05$.

Results

The cohort of 65 patients consisted of 43 females and 22 males. Prevalence of microalbuminuria among males was 37.5% and among females 62.5%. The microalbuminuric patients were older (age 59.71 ± 9.87 vs. 57.07 ± 10.32) and had a longer duration of diabetes compared with normoalbuminuric patients. (7.74 ± 5.74 vs 4.45 ± 5.08) ($p=0.01$). Group A had significantly higher LVMI compared with Group B ($p= 0.02$, Figure 1). The preva-

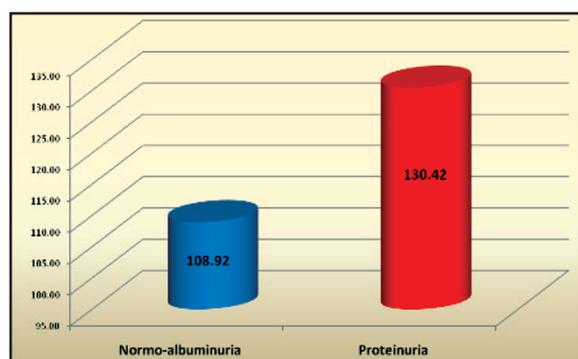


Figure 1: The mean value of LVMI in two groups.

lence of LVMI in Group A was 66.7% vs 48.8% in Group B ($p=0.01$). Systolic and diastolic blood pressure did not differ between two groups ($p=0.1$).

Glycosylated hemoglobin was high in both groups (10.48 ± 2.23 for Group A and 10.63 ± 3.08 for Group B) without being any significant difference between them ($p=0.9$). The prevalence of obesity (BMI >30kg/m²) in type 2 diabetic patients was 44.6%. In Group A the mean value of BMI (30.13) was higher compared with that of Group B. (30.13 ± 4.98 vs 28.00 ± 3.72) ($p= 0.04$).

Retinopathy was more frequent in patients of group A compared to those of Group B (33.3% vs 14.6%, $p= 0.05$, Figure 2) Group A presented IMT higher than Group B (1.28 ± 0.35 vs 1.09 ± 0.28 , $p= 0.03$, Figure 3).

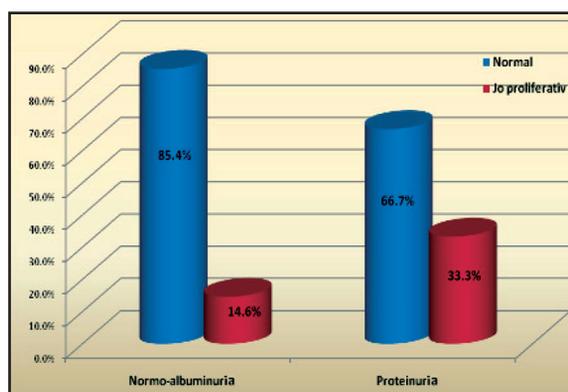


Figure 2: Retinopathy in each group.

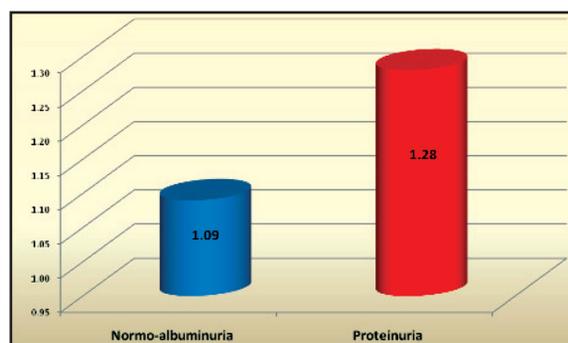


Figure 3: The mean value of IMT in each group.

Discussion

The present study provides evidence, that low-grade urinary albumin excretion may be associated with other risk factors of CVD. The prevalence of microalbuminuria in patients with diabetes is high (30-40%) and it is similar to our finding in the present study (32.3%)⁶.

Our study showed that duration of diabetes and obesity are risk factors for microalbuminuria.

Microalbuminuria is a predictor of renal failure in patients with diabetes and the early detection and good glycaemic control may delay it.

The "Strong Heart Study" demonstrate a significant

Table 1: Clinical and biochemical characteristics of the study.

Parameter	Group B	Group A	p-value
Age (years)	57.07	59.71	NS
Gender: Male	31.7%	37.5%	--
Female	68.3%	62.5%	-
Duration of diabetes (years)	4.45	7.74	0.01
SBP mmHg	137.5	143.3	NS
DBP mmHg	84.3	87.9	NS
BMI kg/m ²	28	30	0.04
HbA1C	10.4	10.6	NS
Retinopathy	14.6%	33.3%	0.05
LVMI g/m ²	108.9	130.42	0.02
IMT	1.09	1.28	0.03

SBP - systolic blood pressure; DBP- diastolic blood pressure; BMI- body mass index; HbA1C- glycosylated hemoglobin; LVMI- left ventricular mass index; IMT- intima media thickness.

correlation between microalbuminuria and LVMI¹⁸. In our study this correlation is significant, too.

Retinopathy is present in greater extent in patients with microalbuminuria compared with patients with normoalbuminuria¹⁹⁻²¹.

In recent studies, microalbuminuria is strongly correlated with atherogenetic process in diabetic patients¹⁶. IMT is an independent predictor of atherogenetic process and in our study microalbuminuria correlates with IMT.

Prevalence of BMI > 30kg/m² is higher in type 2 diabetic patients². In a multicentre study, with large number of patients, prevalence of BMI > 30kg/m² was 36.9%. In our study this prevalence was 44.6% and in the microalbuminuric group the mean value of BMI was higher than the normomicroalbuminuric group, confirming the role of obesity as independent risk factor for microalbuminuria.

Epidemiological studies have demonstrated that the factors strictly correlated to the progression of nephropathy in diabetic patients are arterial blood pressure, glycemic control, lipid levels, obesity, duration of diabetes and cigarette smoking²³⁻²⁵. Other factors, which are reported to be associated to microalbuminuria, are alcohol and foot ulcers, not investigated in our study.

In conclusion the prevalence of microalbuminuria in patients with type 2 diabetes is high. In the microalbuminuric group LVMI, IMT, BMI, duration of diabetes was significantly higher than the normoalbuminuric group.

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