Prevalence of microalbuminuria in hypertension monitored in primary care

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Abstract

The objectives of the study were to evaluate the prevalence of microalbuminuria (MAU) in patients with hypertension, monitored in primary care and to analyse the correlation between MAU, risk factors and associated parameters.

***Material and methods**. During 2010-2014 we evaluated a number of 910 patients from 19 family medicine offices of Timiş County. The general practitioners took a standardized history, performed a physical examination, measured height, weight, blood pressure, ABPM and heart rate, calculated body mass index and tested urine for MAU with Arkray test strips. The patients with hypertension and MAU were referred to diagnosis centres where they underwent echocardiography.*

***Results.** After exclusion of patients with a history of renal disease and diabetes, MAU was present in 61 cases, 7.1%. The mean age of the MAU positive patients was 56±13.1 years, ranging from 29 to 79. The duration of hypertension was under 5 years in 4 (2.44%) patients, between 5-10 years in 35 (57.3%) and over 10 years in 22 (36%) Six patients with MAU (9.83%) had mild hypertension, 25 (40.9%) moderate and 30 (49.1%) severe hypertension. LVMI was 125 ± 28 g/m2 in the MAU absent group and 157 ± 56 g/m2 in the MAU present group (<0.04). A stepwise logistic regression analysis showed significant positive effects of 24 h systolic blood pressure, weight and LVH (p<0.001 for all comparisons) on MAU. No other variable had a significant predictive effect on the presence or absence of MAU.*

***Conclusions.** In patients with essential hypertension MAU was present in 7.1%, with a higher prevalence in uncontrolled than in controlled hypertension. MAU was associated with high blood pressure levels, obesity and LVH.*

Keywords: hypertension, microalbuminuria, primary care

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INTRODUCTION

The European Society of Cardiology Hypertension Guidelines 2013 outline that it becomes more and more important to determine the target organ damage secondary to hypertension (1). The presence of MAU in patients with essential hypertension is related to cardiovascular morbidity and mortality, independent of other well-known risk factors. Microalbuminuria, in addition to being an early sign of kidney damage, is often found in patients with essential hypertension. Even very low levels of microalbuminuria strongly correlate with CV risk, independent of the presence of other risk factors. Increased microalbuminuria indicates endothelial dysfunction and predicts end-organ damage, cardio- and cerebrovascular events and death (2,3). European guidelines recommend screening for microalbuminuria in patients with hypertension. Available tests for screening microalbuminuria as deep sticks are sensitive and accessible. Early identification of high-risk patients through detection of MAU allows selection of an aggressive treatment to slow disease progression. Antihypertensive agents providing angiotensin II blockade are recommended for the treatment of hypertensive patients with MAU, as they assure effective reduction of MAU, blood pressure, and long-term prevention of CV events beyond blood pressure reduction. In this way a substantially reduced burden on healthcare resources can be obtained (4).

THE OBJECTIVES OF THE STUDY

- To evaluate the incidence of microalbuminuria in controlled and uncontrolled hypertension in primary care
- To analyse the association between microalbuminuria, risk factors and other clinical data.

MATERIAL AND METHODS

We evaluated during 2010-2014 a total number of 910 hypertensive patients from 19 family medicine offices of Timiş County. Uncontrolled hypertension was defined as blood pressure ≥140/≥90 mmHg, when subjects reported lifestyle changes and medication consisting of ≥1 antihypertensive drug. All family doctors implied in the study were instructed to use the same method of BP measurement and patient evaluation.

The general practitioners performed the history, the physical examination and calculated the body mass index (BMI). A spot urine sample was tested for MAU at the family doctor's office with Arkray test strips, that provide the following readings for urinary albumin: negative, ≥10 mg/L, ≥ 30 mg/L, ≥ 80 mg/L and ≥ 150 mg/L. Creatinine readings were for concentrations of 10 mg/dl, 50 mg/dl, 100 mg/dl, 200 mg/dl and 300 mg/dl (Fig. 1). Albumin creatinine ratio was calculated by intersection of their values (Fig. 2). The patients with hypertension and microalbuminuria were referred by their general practitioners to a diagnosis centre, where they underwent echocardiography. Only patients with complete measurements were included in the study.

STATISTICAL ANALYSIS

All the statistical analyses were performed using the software Stata 9.2. Data were presented as frequencies and percentages for qualitative variables and as mean ± SD for quantitative variables. Differences between groups of variables were assessed with the Pearson x^2 for qualitative variables and the Student t test for quantitative data. The independent variables

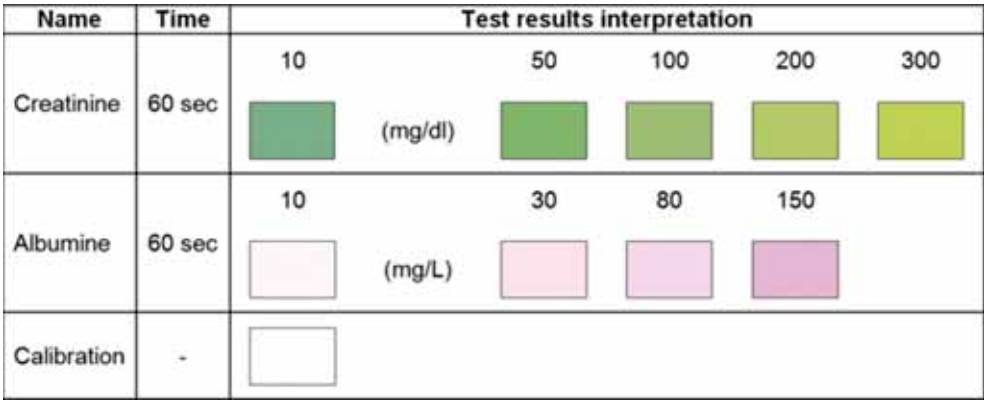

FIGURE 1. *Interpretation of albumin and creatinine concentrations by the coloration of Arkray test strips*

Albumin mg/L	Creatinine mg/dl				
	10	50	100	200	300
10	Re-analysis	Normal	Normal	Normal	Normal
30	+2	+1	+1	Normal	Normal
80	+2	+1	+1	+1	Normal
150	+2	+2	+1	+1	+1

FIGURE 2. *Albumin creatinin ratio: normal range, +1(MAU) and +2 (macroalbuminuria)*

with $p < 0.05$, were considered as having statistical significance.

RESULTS

The blood pressure values of controlled and uncontrolled hypertension patients are presented in Fig. 3. After exclusion of cases with a history of renal disease and with diabetes, MAU remained present in 61 cases (13.41%), of which 22 (4.3%) with controlled hypertension and 39 (9.11%) with uncontrolled (Fig. 4).

The characteristics of patients with and without MAU are presented in the Table 1.

Concerning gender repartition of microabuminuria patients, 44.26 % were male and 55.73% female (Fig. 5).

The mean age of the patients was 56±13.1 years, ranging from 29 to 79, the majority being between 50 and 60 years. There were 3 cases (4.9%) with MAU under 40 years, 6 cases (9.8%) between 40-50 years, 31 cases (50.8%) between 50-60 years and 21 cases (34.4%) over the age of 60 years old. Age groups of patients with MAU are presented in Fig. 6.

The evolution in time of hypertension showed: a hypertension duration under 5 years in 2.44%, between 5-10 years in 57.3% and over 10 years in 36% (Fig. 7).

The severity degree of hypertension was evaluated after the recommendations of the Hypertension Guidelines of the European Society of Cardiology published in 2013 (Fig. 8).

Depending on the hypertension profile, the patients were divided in two groups: the dipper group of 27 (44.2%) and the non-dipper group, consisting of 34 patients (45.8%), whose hypertension fell less than 10% during the night time (Fig. 9).

Concerning the cardiovascular risk of the patients that associated MAU, 47 cases (77.8%) had a high and very high risk, 12 cases (19.6%) a moderate risk and 2 cases (3.2%) a low CV risk (Fig. 10).

The main cardiovascular risk factors among hypertensive subjects with MAU were: physical inactivity in 60.6%, smoking in 21.3%, a family history of premature cardiovascular disease in24.5%, obesity in 40.98%, lipid disorders in 50.8% and metabolic syndrome in 52.4%. Left ventricular mass index was higher in MAU patients than in normal buminuria hypertensives.

A stepwise logistic regression with MAU as the dependent variable and as independent variables age, gender, height, weight, BMI, 24 h systolic and diastolic blood pressure, left ventricular hypertrophy, showed significant positive effects of 24 h systolic blood pressure

TABLE 1. *Characteristics of patients with and without MA*

Characteristics	***MAU absent; n = 87***	***MAU present; n = 61***	***p***
Gender: male	42%	58%	NS
Age (years)	52 ± 7	49 ± 8	NS
Height (cm)	166 ± 9	168 ± 10	NS
Weight (kg)	77± 14	86 ± 16	< 0.05
BMI (kg/m^2)	27.5 ± 4.5	31.9 ± 8.7	< 0.05
Plasma creatinine (mg/dl)	0.8 ± 0.03	0.8 ± 0.04	NS
Average 24 h BP (mmHg)	131/82 ± 13/8	149/86 ± 14/10	< 0.001
Left ventricular mass (g)	216 ± 53 (men)	266 ± 70 (men)	< 0.05
	170 ± 50 (women)	209 ± 61 (women)	< 0.05

Data are expressed as mean ± SD, BP = blood pressure

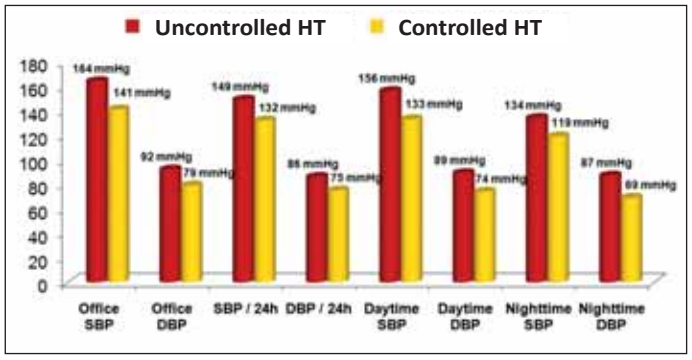

FIGURE 3. *Blood pressure values in controlled and uncontrolled hypertension*

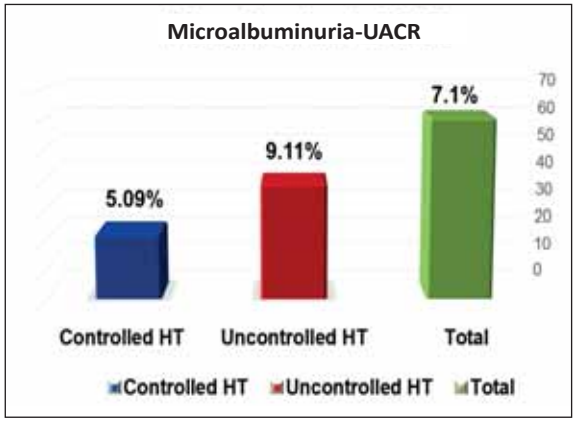

FIGURE 4. *MAU determined by UACR in controlled and uncontrolled hypertension*

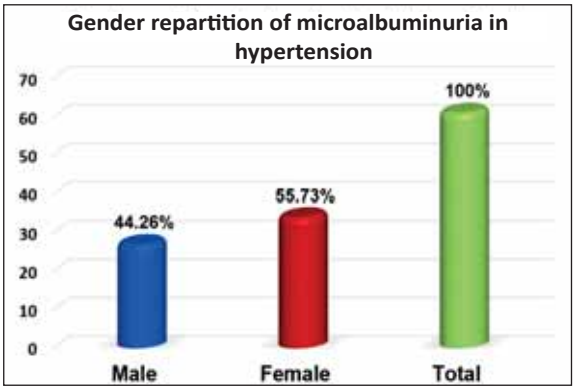

FIGURE 5. *Gender repartition of hypertension with MAU*

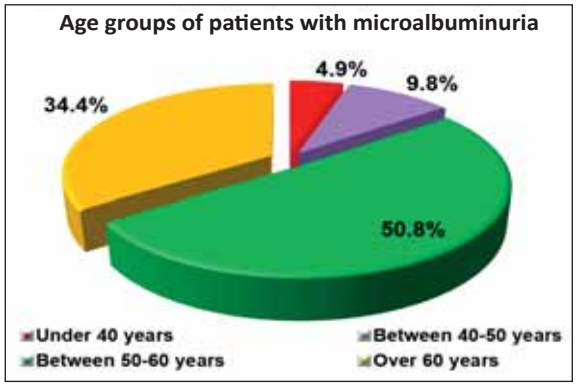

FIGURE 6. *Age groups of patients with MAU*

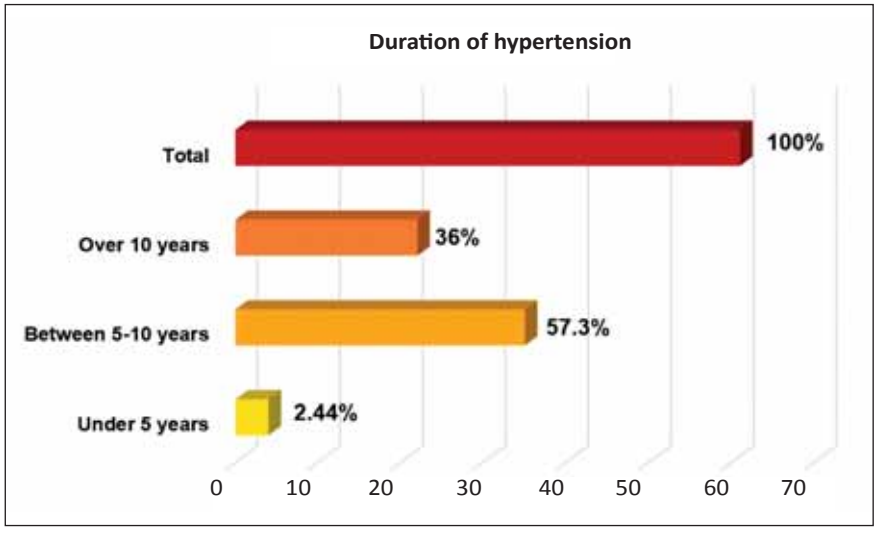

FIGURE 7. *Duration of hypertension with MAU*

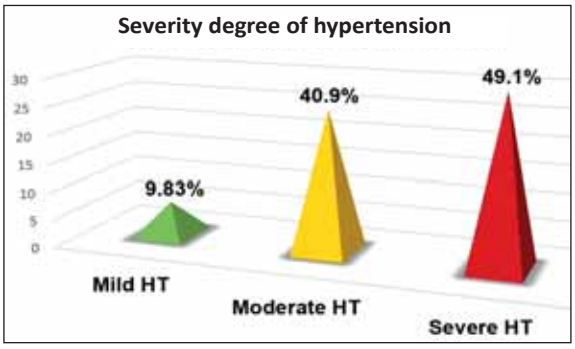

FIGURE 8. *Severity degree of hypertension with MAU*

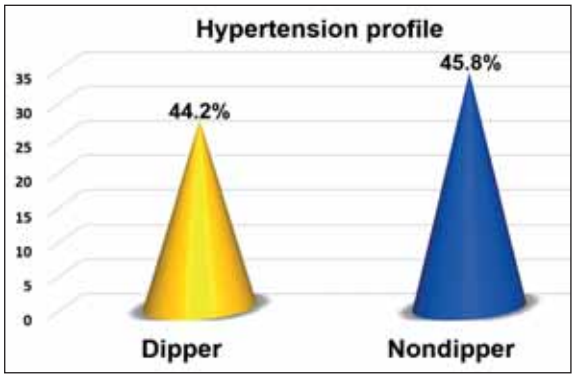

FIGURE 9. *Hypertension's profile in patients with MAU*

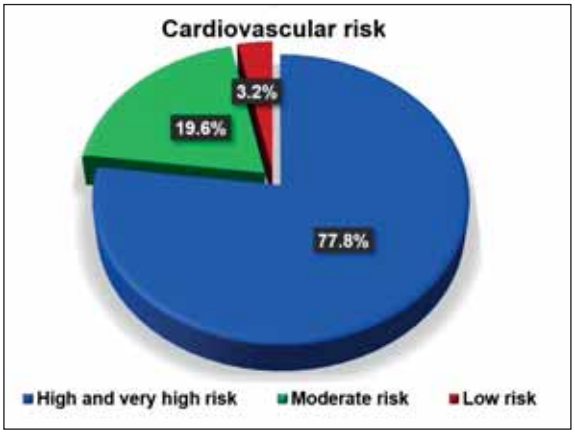

FIGURE 10. *Cardiovascular risk of hypertension associating MAU*

(p<0.0001), weight (p<0.001) and LVH (p<0.001). No other variables had a significant predictive effect on the presence or absence of MAU.

DISCUSSIONS

Urine excretion of albumin is highly variable, from nondetectable to milligrams and even grams of albumin. Microalbuminuria is defined as albumin excretion of 30 to 300 mg/day (5). Microalbuminuria is highly prevalent in hypertensive and diabetic populations, form 10 to 40%. Microalbuminuria also is found in 5 to 7% healthy individuals. The excretion of albumin in the urine is related to the risk to develop cardiovascular disease (6). The International Survey Evaluating microalbuminuria by cardiologists in patients with hypertension (i-SEARCH) was undertaken in 26 countries around the world in a total of 1,750 sites to provide epidemiological data on the prevalence of MAU and its associations with established cardiovascular risk markers and disease.

Our study evaluated a population of hypertensive patients monitored by general practitioners. We found a total prevalence of MAU of 7.1% that was lower in controlled hypertension than in uncontrolled hypertension, dependent on- the level of 24 h average systolic blood pressure, bodyweight and left ventricular hypertrophy (7).

We recorded as in the SEPHAR II survey only in a minority of cases MAU, as the most important part of hypertensive patients didn't present this subclinical organ damage (7,8).

Many studies investigated the relationship between the number of cardiovascular comorbidities and the presence of MAU in hypertension. The prevalence of MAU increased from 54% in patients without cardiovascular comorbidities to 74% in the presence of more than 3 comorbidities. The conclusion is that in hypertensive patients at high cardiovascular risk, the prevalence and extent of MAU increases with the number of comorbidities (8,9).

Our data confirm previous studies that have demonstrated a relationship between albumin excretion rate and the level of systolic blood pressure. As showed, most of the patients had severe hypertension with high cardiovascular risk. The positive relation of MAU to bodyweight is demonstrated in some other surveys (10). Many clinical trials have not been able to demonstrate a significant relationship between MAU and age, aspect that requires further confirmation (11).

As in other studies, we found that LV mass is increased in patients with MAU and might quite well account for the observed increase in cardiovascular morbidity and mortality in patients with MAU.

CONCLUSIONS

Early signs of hypertensive nephropathy as MAU can be easily detected by general practitioners with test strips.

Microalbuminuria was present in 7.1% of patients with essential hypertension, with a higher prevalence in uncontrolled than in controlled hypertension.

MAU was associated with high blood pressure levels, obesity and an increase in left ventricular mass.

Microalbuminuria reflects a state of pathophysiologic vascular dysfunction that makes an individual susceptible to organ damage.

Further studies are needed to elucidate the underlying links between MAU and left ventricular structure.

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