Frequency of microalbuminuria and its relationship with other atherosclerotic risk factors in nondiabetic hypertensive patients

Diyabetik olmayan hipertansif hastalarda metabolik sendrom fenotipi ve mikroalbuminüri birlikteliği

Hypertension is a public health problem, which importance is being increased. Therefore, it is thought that the use of risk markers in early stage for follow-up of hypertensive patients, before the occurrence of end stage organ damage, can decrease morbidity and mortality (1). Microalbuminuria, defined as 20-200 μg/min or 30-300 mg/day albumin excretion in urine, increases the risk for development of cardiovascular and renal diseases in patients with essential hypertension (2). It is an important early sign of atherosclerosis characterized with endothelial damage and increased vascular permeability (3). Metabolic syndrome (MS) is another risk factor for cardiovascular disease (4). The frequency of MS has been reported to be higher in hypertensive patients (5). In the present study, we aimed to investigate retrospectively the frequencies of microalbuminuria and MS and their relation with each other as well as the relationship between microalbuminuria and other cardiovascular risk factors in nondiabetic newly diagnosed untreated hypertensive patients.

Records of the patients applied to our outpatient clinics between August 2003 and September 2004. Patients were included in the study if they were newly diagnosed and had never been previously treated for hypertension. Exclusion criteria were known diabetes mellitus, more than 6.1 mmol/L fasting plasma glucose, overt proteinuria, heart failure, renal, hepatic and heart disease, treatment with antilipidemic agents or secondary hypertension.

Diagnosis of hypertension was based on blood pressure values ≥140/90 mmHg. Urinary albumin excretion (UAE) was measured in 24-h urine samples by nephelometry. Body mass index (BMI) was calculated in conventional way. Age, smoking, systolic and diastolic blood pressures, waist circumference, fasting plasma glucose, total cholesterol, High density lipoprotein (HDL), low density lipoprotein (LDL), triglyceride, UAE in 24 h urine collections of all patients were recorded before giving any antihypertensive therapy. Metabolic syndrome was defined according to ATP III criteria.

Statistical analysis was performed using SPSS for Windows software (Chicago, IL, USA). P values below 0.05 were considered significant. Demographic, clinical and biochemical features of all participants of the study are shown in Table 1. Microalbuminuria was detected in 54.8% of whole study population. Frequency of microalbuminuria was 60.3% in women and 42.2% in men, but the difference was not statistically significant ($p>0.05$). The frequency of MS was found to be 65.1% in whole study population and its frequency was significantly higher in women than men (74% versus 52.8%, $p<0.05$).

Urinary albumin excretion was significantly higher in both male (80±65 mg/day) and female (75±25 mg/day) patients with MS when compared to those without MS. Chi-square analysis showed that microalbuminuria and metabolic syndrome were statistically significantly related ($p<0.001$). Age, systolic and diastolic blood pressure, stage of hypertension, BMI, waist circumference and obesity were found to be correlating factors with microalbuminuria in both sexes. On the other hand, HDL and triglyceride correlated with microalbuminuria only in women and smoking correlated with microalbuminuria only in men (Table 2).

Cardiovascular morbidity and mortality risk is not the same for all hypertensive patients. It is important to detect patients with high risk early (1). Microalbuminuria has been emphasized as an important predictor of increased risk in essential hypertension (2, 6, 7). In the literature, frequency of microalbuminuria has been reported within from 4.7% to 40%. Frequency of microalbuminuria among nondiabetic hypertensive patients was reported as 38% by Bigazzi et al. and 32% by Grandi et al. (8,6). In our study, we found the frequency of microalbuminuria (54.8%) to be higher than those reported in previous studies. This may be related with higher average age of the patients, high rates of obesity and smoking in our study population.

It has been reported that MS increases the risk of deaths from atherosclerotic heart disease in men 2.9 times the normal. The prevalence of MS in the population varies between 8.8-14.3% in Europe and 22.6-22.7% in United States (5). It is more prevalent in nondiabetic newly diagnosed hypertensive patients than normal population (9). The frequency of MS was detected as 49.4% by Segura et al and 62% by Vigoa et al. in hypertensive patients (5, 10). These two frequency rates of MS are similar to the rate (65.1%) that we found in the present study.

The presence of microalbuminuria was highly associated with MS (4). In the present study, we found that microalbumi-

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Table 1. Demographic, clinical and biochemical features of the patients with nondiabetic hypertension

Variables	Women (n=73)	Men (n=53)	Total (n=126)
Age, years	54 ± 9	57 ± 11	55 ± 13
Smoking, n	11*	23*	39
SBP, mmHg	163 ± 13	161 ± 14	162 ± 14
DBP, mmHg	96 ± 8	97 ± 10	96 ± 9
BMI, kg/m^2	30 ± 5	30 ± 5	30 ± 5
Obesity (BMI ≥30 kg/m^2), n	51**	19**	70
Waist circumference, cm	95 ± 12	96 ± 13	95 ± 13
Fasting plasma glucose, mmol/L	5.2 ± 0.3	5.2 ± 0.2	5.2 ± 0.3
Total cholesterol, mmol/L	5.4 ± 1.0	5.6 ± 1.1	5.5 ± 1.0
HDL, mmol/L	1.2 ± 0.3	1.0 ± 0.2	1.1 ± 0.3
LDL, mmol/L	3.0 ± 0.8	3.2 ± 0.8	3.1 ± 0.8
Triglycerides, mmol/L	2.4± 1.6	2.6 ± 1.6	2.5 ±1.6
Microalbuminuria, n	44	25	69
UAE, mg/day	63 ± 53	64 ± 64	63 ± 58
MS, n	54*	28*	82

* p<0.05
**p<0.001
BMI- body mass index, DBP- diastolic blood pressure, HDL- high-density lipoprotein cholesterol, LDL- low-density lipoprotein cholesterol, MS- metabolic syndrome, SBP- systolic blood pressure, UAE- urinary albumin excretion.
Microalbuminuria- 30-300 mg/day albuminuria

nuria frequency and UAE are significantly higher with MS than those without MS. This was an expected result because all components of MS are also accepted as atherosclerotic cardiovascular risk factors. Significantly higher frequency of microalbuminuria in patients with MS suggests that hypertensive patients with MS are at high risk for atherosclerotic diseases.

We detected an increase in UAE with increasing age, blood pressure values and severity of obesity in both male and female patients. In addition, low HDL and high triglyceride levels in women and smoking in men were found to be correlated with UAE.

Detection of the high frequency and severity of microalbuminuria in nondiabetic patients with essential hypertension and MS suggests that these patients are at high risk for atherosclerotic cardiovascular diseases. Microalbuminuria may indicate endothelial damage, which results from cumulative effect of atherosclerotic risk factors and it can be possible to prevent or improve atherosclerotic cardiovascular diseases with the removal of risk factors and with the effective treatment of microalbuminuria.

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Table 2. Features of the male and female patients with and without microalbuminuria and association of microalbuminuria with atherosclerotic risk factors

Variables	WOMEN				MEN			
	MA absent (n=29)	MA present (n=44)	p1	p2	MA absent (n=25)	MA present (n=28)	p1	p2
Age, years	51±8	56±9	0.005	0.006	53±10	62±11	0.004	0.034
Smoking, n	2	9	NS	NS	5	18	<0.0001	0.009
SBP, mmHg	158±12	166±13	0.021	0.01	157±13	165±14	0.05	0.012
DBP, mmHg	95±7	97±9	NS	0.01	95±10	98±11	NS	0.021
BMI, kg/m^2	27±3	32.5±5	NS	0.01	27±3	32±6	0.001	<0.0001
Stage of hypertension, n stage 1/stage2	14/15	13/31	<0.0001	<0.0001	14/14	6/19	0.05	0.02
Obesity, n BMI≥30 kg/m^2	12	39	<0.0001	<0.0001	2	17	<0.0001	<0.0001
Waist circumference, cm	88±9	100±11	<0.0001	<0.0001	89±8	103±14	<0.0001	0.001
FPG, mmol/L	5.2±0.3	5.2±0.3	NS	NS	5.2±0.3	5.3±0.2	NS	NS
Total cholesterol, mmol/L	5.3±0.7	5.5±1.2	NS	NS	5.5±1.0	5.7±1.2	NS	NS
HDL, mmol/L	1.2±0.3	1.1±0.3	NS	0.046	0.9±0.2	1.0±0.2	NS	NS
LDL, mmol/L	3.1±0.6	3.1±09	NS	NS	3.2±0.6	3.2±0.9	NS	NS
Triglycerides, mmol/L	2.1±1.9	2.5±1.3	NS	0.001	2.5±1.8	2.6±12.1	NS	NS

BMI- body mass index, DBP- diastolic blood pressure, FPG- fasting plasma glucose, HDL- high-density lipoprotein cholesterol, LDL- low-density lipoprotein cholesterol,
MA (Microalbuminuria)- 30-300 mg/day albuminuria, NS- not significant, SBP- systolic blood pressure
P1- statistical significance of differences in variables between the groups with and without microalbuminuria
P2- statistical significance of correlations of urinary albumin excretion with variables

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