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ORIGINAL RESEARCH PAPER

The Evaluation of Relationship Between Microalbuminuria Frequency and Life Style Parameters in Non-Diabetic Prehypertensive Patients

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Abstract

***Background**: Prehypertension is a stage that can be prevented to progress hypertension by appropriate adjustments in the lifestyle parameters. Detection of microalbuminuria, pointed that prehypertension will pass to hypertensive phase at this stage. In this study, our aim is to evaluate the frequency of microalbuminuria and its relationship with lifestyle parameters in non-diabetic prehypertensive patients.*

***Method**: The study was carried out between 2011 and 2012 in the department of internal medicine at Dicle University, Faculty of Medicine. The files of 100 nondiabetic prehypertensive patients aged between 18 – 65 were evaluated retrospectively. Demographic characteristics, blood pressure measurements, body mass index, biochemical parameters, microalbuminuria levels and associated factors such as smoking, alcohol use, lifestyle activities and nutrition types were noted from patient files.*

***Results:** Patients were divided into two groups, as group 1: (n = 90), normo albuminuric, and group 2: (n = 10)microalbuminuric. The frequency of microalbuminuria was found as 10 % among the patients. SBP, DBP, and BMI were measured as much higher in group 2 than in group 1. There were statistically significant positive correlation between microalbuminuria and SBP, DBP, BMI, smoking and negative correlation between microalbuminuria and sedentary lifestyle. Body mass index OR: 7,667 (%95 CI:2,620-22,438) and smoking OR:12,000 (%95CI:3,954-36,418) were*

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determined the most effective parameters in increasing microalbuminuria among independent parameters.

Conclusion: *The frequency of microalbuminuria was found as 10% among the patients. Body mass index and smoking were the most significant parameters in increasing microalbuminuria among independent parameters. Regulation of body mass index and smoking cessation can prevent microalbuminuria in prehypertensive patients.*

Key words: *prehypertension, microalbuminuria, body mass index, smoking*

Introduction

Prehypertension is defined as a systolic blood pressure(SBP) of 120-139 mmHg and/or a diastolic blood pressure (DBP) of 80-89 mmHg in the Joint National Committee 7 (JNC7) report (1). Patients at this stage are neither normotensive nor hypertensive. However, clinical consequences engendered by this situation arises as a major public health problem. It is a remarkable clinical condition because it is observed in the large part of adult population (30-50 %), associated with other cardiovascular risk factors and also increases the risk of hypertension and hypertension induced cardiovascular events (2-4). Elevation of blood pressure is a major cause of morbidity and mortality due to causing target organ damage. It is known that elevated blood pressure cause vascular endothelial damage.

Microalbuminuria, as a result of endothelial dysfunction in the glomeruli, is observed in both hypertensive and prehypertensive patients (5,6,7). For the prevelance of microalbuminuria in prehypertensive population, we can see the rate of 4% in a recently conducted study (3) and the rate of 6,3% in another study(8). Microalbuminuria is a marker of endothelial dysfunction and associated with the increased cardiovascular, renal and cerebrovascular morbidity and mortality.
Relationship with lifestyle parameters is another important feature of prehypertensive stage. If patients in this stage can reach the desired objectives of individual lifestyle parameters, hypertension and hypertension induced cardiovascular events which may develop in the future can be suppressed. Lifestyle parameters are also utilized in framingham study when calculating hypertension risk score(9). Thus, lifestyle parameters are important for patients both in hypertensive and prehypertensive stage. Therefore, if it is shown which of the lifestyle parameters are associated with microalbuminuria, potential cardiovascular, renal and cerebrovascular events can be reduced by the measures to be taken in this regard.
In the light of above data, our aim in this study is to evaluate the prevalence of microalbuminuria in non diabetic prehypertensive population and relationship of microalbuminuria with lifestyle parameters.

Materials and methods

The study was carried out in the department of internal medicine in Faculty of Medicine in Dicle University, between 2011 and 2012. The files of 100 nondiabetic prehypertensive patients age

between 18 – 65 years old were evaluated retrospectively. Ethics committee approval was taken from Dicle University Faculty of Medicine Ethics Board.

Patients's demographic charecteristics, blood pressures, body mass index and microalbuminuria levels were taken from patient files and lifestyle informations which may be associated with microalbuminuria such as smoking, alcohol consumption and diet were obtained from patients themselves and/or patient files.

Patients who had one or more of the following diseases or conditions were excluded from the study; these were diabetes mellitus, heart failure, atherosclerotic cardiovascular diseases, chronic kidney disease, vasculitis, nephrotic or nephritic syndrome, malignancies, history of cerebrovascular disease, solitary kidney or renal transplantation, cirrhotic liver diseases, etiologies that may cause secondary hypertension such as suprarenal mass, obstructive sleep-apnea syndrome, pregnancy, cushing syndrome or hypertensive attacks.

Blood pressure of patients were measured in accordance with procedure by pneumatic sphygmomanometer and patients with systolic blood pressure of 120-139 mmHg and/or diastolic diastolic blood pressure of 80-89 mmHg were enrolled in the study.
Microalbuminuri had been studied in the central laboratory by nephelometric method with the device DADE BEHRING (Siemens, İllinois, USA).

Fasting glucose, urea, creatinine, albumine, cholesterol levels had been studied by the Architect/C8000 Autoanalyser (Abbott Diagnostics, Illinois, USA). These parameters and hemoglobin levels of patients were obtained from patient files.
Body mass index (BMI) was calculated as the individual's body mass divided by the square of their weight-with the value universally being given in units of kg/m2. Patients with BMI 30 kg/m2 were considered as obese (10).

Statistical analyses

Data analyses were performed by using Statistical Package for Social Sciences (SPSS), Version 16.0 for Windows (SPSS Inc, Chicago, IL, USA). Student's t test for independent variables, Chi-square test and odds ratio proportion for categorical variables and Pearson correlation test for relationship between the dependent parameters were used. Multiple lineer regression test was used

for the relationship between microalbuminuria and lifesyle parameters to explain which parameters mostly influence microalbuminuria.

Datas were expressed as mean value, ± SD. Results were in % 95 confidence interval, $p < 0.05$ standart deviation level were accepted as statistically meaningful.

Results

The files of 100 patients which having adequate data were evaluated. Patients were divided into two groups as group 1: normoalbuminuric and group 2: microalbuminuric. Group 1 was consisted of 90 patients and group 2 was consisted of 10 patients. Mcroalbuminuria prevelance was detected as 10% in prehypertensive patients. Between two groups there was no statistically significant difference in terms of age, sex and parameters of GFR, urea, creatinine, glucose, albumine, total cholesterol and hemoglobin. Levels of SBP, DBP and BMI were higher in group 1 compared to group 2. The characteristics of the patients with prehypertension have been summarized in table 1.

Table 1: Demographic, clinical and laboratory characteristics of patients

Parameters	Group 1 (n=90)	Group 2 (n=10)	P
Age(year)	44,55±11,94	41,20±10,78	0,397
Sex (M/F)	33/57	3/7	0,677
GFR (ml/min)	103,21±33,28	89,93±46,42	0,254
Microalbuminuria (gr/day)	6,54±4,59	91,91±59,02	**< 0,001**
Systolic BP(mmHg)	126,41±6,12	135,40±2,94	**< 0,001**
Diastolic BP(mmHg)	81,70±5,62	86,10±1,74	**0,001**
BMI (kg/m^2)	25,48±5,12	30,06±7,90	**0,013**
Urea (mg/dl)	25,35±7,44	30,00±17,26	0,117
Creatinine(mg/dl)	0,71±0,15	0,74±0,28	0,586
Glucose(mg/dl)	99,68±13,35	97,80±12,94	0,672
Albumin(g/dl)	4,06±0,38	3,89±0,44	0,193
Total cholesterol(mg/dl)	192,70±36,66	205,10±30,22	0,306
Hemoglobin(g/dl)	14,04±1,66	13,30±2,46	0,123

GFR: Glomerular filtration rate BP: Blood pressure BMI: Body mass index

Two groups were compared according to lifestyle paramaters and there was statistically significant difference between two groups except for alcohol consumption (table 2).

Table 2: Comparison of lifestyle characteristics of patients

Parameters	Group 1 (n=90)	Group 2 (n=10)	P
Smoking (Y/N)	10/80	6/4	**<0,001**
Alcohol (Y/N)	2/88	1/9	**0,171**
Daily activity(Y/N)	66/24	3/7	**0,005**
Diet(F/V)	11/79	4/6	**0,020**
Obesity(Y/N)	21/69	7/3	**0,002**

Y:yes, N:no, F: fatty, V: vegetables

Relationship between microalbuminuria and independent variables was evaluated (table 3). There were no statistically significant relationship for sex, age, alcohol consumption and diet. However, there were statistically significant positive relationship for SBP, DBP, smoking, BMI and statistically significant negative relationship for sedantary lifestyle.

Table 3: Relationship between microalbuminuria and independent variables

Parameters	r	p
MA & Sex	0,066	0,511
MA & Age	0,105	0,300
MA & SBP	0,344	**<0,001**
MA & DBP	0,261	**0,006**
MA & Smoking	0,458	**<0,001**
MA & Alcohol consumption	0,050	0,624
MA & Sedantary lifestyle	-0,253	**0,011**
MA & Diet	-0,178	0,076
MA & BMI	0,335	**0,001**

MA: Microalbuminuria SBP:Systolic Blood Pressure
DBP: Diastolic Blood Pressure BMI: Body Mass Index

In odds ratio analysis, body mass index and smoking were mostly associated with increased incidence of microalbuminuria among independent variables (Table 4).

Table 4: Odds ratio results of lifestyle parameters which were related to microalbuminuria

		% 95 Confidence Interval		
Parameters	Value	lower	Upper	P
Body Mass Index	7,667	2,620	22,438	< 0,001
Smoking	12,000	3,954	36,418	<0,001
Daily activity	0,156	0,054	0,452	<0,001
Diet	0,209	0,070	0,624	0,003

In multiple lineer regression analysis, body mass index and smoking were mostly associated with increased incidence of microalbuminuria among independent variables. This relationship was shown in figure 1 and figure 2.

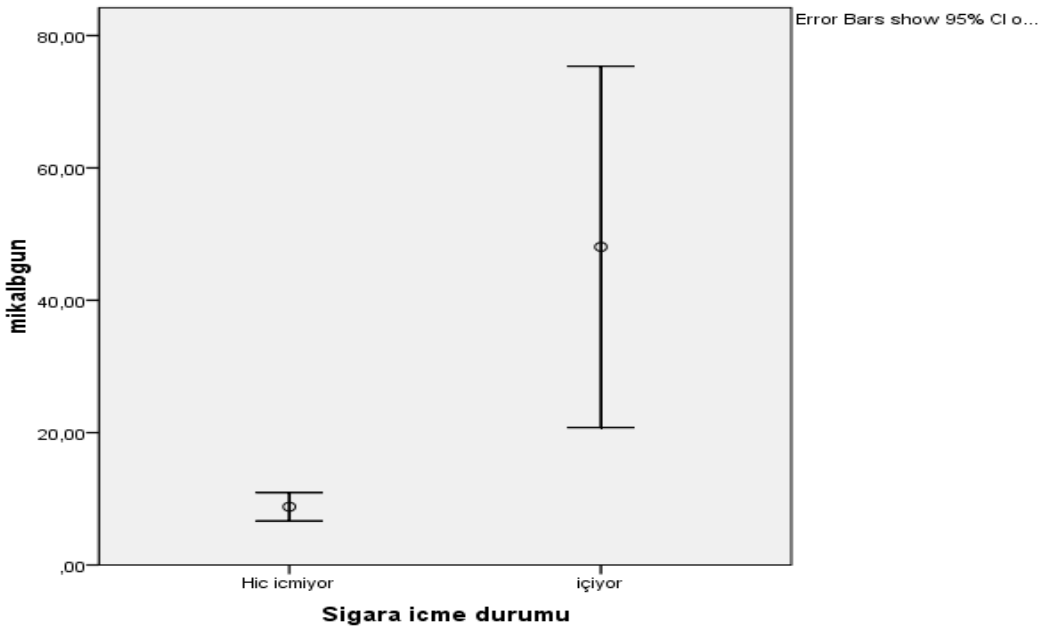

Figure 1: relationship between microalbuminuria and smoking

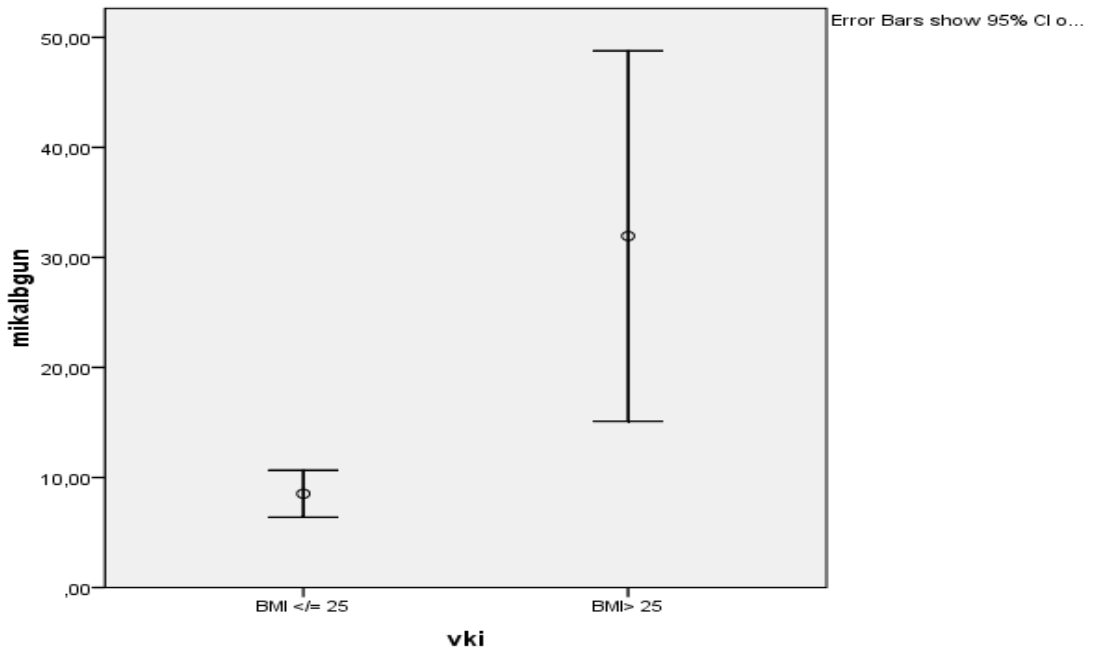

Figure 2: relationship between microalbuminuria and BMI

Discussion

Hypertension is the commonest risk factor within the preventable causes of death in the World. Overall, 26.4 % of adult population in 2000 had hypertension and 29.2% (about 1.5 billion people) had been predicted to have hypertenison by 2025 (11). The situation is similar in our country, 1 of every 3 people, about 15 million people, have suggested to have hypertension according to the Turkish Hypertension Prevalence Study (3). Prehypertension is important because of two reasons. Firstly, progression to hypertension is most prominent than in normotensives. In a prospective study by Vasan et al., they compared two groups (patients with high normal blood pressure and patients with optimal blood pressure) and they found that progression to the overt hypertension was prominent in high normal blood pressure group (12).

Another important point is determination and therapy of lifestyle parameters that may prepare base for progression to hypertension.

Changing of the capillary electrical charge and diameter by the increase in blood pressure, local renal hemodynamic changes caused by the increase in intraglomerular pressure and/or failure in the tubular reabsorption of albumin cause starting of microalbuminuria (13).

In the literature, about prevalence of microalbuninuria in the prehypertensive population, we find different rates. In a recent study by Maharjan BR et al., prevalence of microalbuminuria was found

9% (14). Similar to this study, microalbuminuria prevalence was detected 10% in our study. There were no statistically significant difference between prehypertensive patients with microalbuminuria and normoalbuminuria in terms of age and sex parameters.

We examined the studies that compare microalbuminuric and normoalbuminuric prehypertansive patients. In a study with prehypertensive patients, blood pressure, smoking rate, body mass index and creatinine clearance were found higher and HDL cholesterol levels were found lower in microalbuminuric group than normoalbuminuric group (15). Crillo M et al found statistically significant relationship between microalbuminuria and blood pressure, plasma cholesterol levels, smoking and body mass index (16). Also a study by Kim BJ et al, microalbuminuria prevalence was found 4.9% and high body mass index, fasting plasma glucose level, triglyceride level, uric acid level and ferritin level were found related to microalbuminuria (17). These results indicate the relationship between microalbuminuria and increased blood pressure levels.

In our study, blood pressure and body mass index of patients in group 2 were higher than group 1. We compared two groups according to lifestyle parameters. Smoking, fat rich diet, sedantary lifestyle and obesity were more common in group 2 than group 1. There was no statistically significant difference between two groups according to alcohol consumption. We also found positive correlation between microalbuminria and blood pressure, BMI, smoking and negative correlation between microalbuminuria and sedantary lifestyle. Creatinine clearence levels were lower in group 2 than group 1 similar to the other studies in the literature which compares microalbuminuric and normoalbuminuric patients (18).

We mentioned above that microalbuminuria is effected by blood pressure. However, there are different opinions in the literature about influence of lifestyle parameters to what extent on micoralbuminuria and which of them mostly influence microalbuminuria.

Nettleton et al. Showed that the diet which contains low fat dairy products, vegetables, fruits and grain-rich reduce the risk of developing microalbuminuria (19). Lin J et al. reported that consuming fatty red meat twice a week or more is directly associated with microalbuminuria (20). In our study, we found that patients in group 2 have dietary habits which rich in fat and low in vegetables and fruits similar to other literature.

In a study to examine the relationship between sedantary lifestyle and development of chronic kidney disease by Bharakhada N et al, they reported that there are statistically significant

relationship between sedantary lifestyle and development of chronic kidney disease in women (21). In our study, we found statistically significant negative relationship between microalbuminuria and sedantary lifestyle. The number of patients with sedantary lifestyle were more frequent than others. In conclusion, we think that sedantary life style cause microalbuminuria and thus led to chronic kidney disease.

Smoking, both its own and enviromental impact, remains a significant problem for human health. Noborisaka Y et al. reported significant relationship between smoking and microalbuminuria (22). Also, Chang A et al reported statisitically significant relationship between microalbuminuria and bad diet habitus, obesity and smoking (23). In our study, number of smokers in group 2 were more than group 1. In addition, statistically significant positive correlation was found with microalbuminuria. Smoking was found the most powerful lifestyle parameter which in relationship with microalbuminuria in the multiple linear regression analysis (Figure 1).

The relationship between microalbuminuria and body mass index or obesity were established by several studies in the literature. It was reported that obesity leads to mciroalbuminuria and chronic kidney disease by the ways that it is the triggering factor for prehypertension (24,25) and hyperleptinemia, the renin-angiotensin-aldosterone system activation, chronic inflammation, endothelial dysfunction, lipid accumulation, renal hemodynamic deterioration and reduction in nephron number (23,26,27). In our study, body mass index values were found significantly higher in group 2 than group 1. The number of obese patients were also more in group 2 than group 1. We observed that there was significant relationship between microalbuminuria and BMI as BMI was the second most powerful lifestyle paramater associated with microalbuminuria (Figure 2).

As a result, microalbuminuria is mostly effected by smoking and BMI among lifestyle parameters.

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