

# Microalbuminuria in Preeclampsia

Şebnem ŞEN ÖZYER, Ömer L. TAPISIZ, Emre Sinan GÜNGÖR, Perran MÖRÖY,  
Leyla MOLLAMAHMUTOĞLU, Nuri DANIŞMAN

Ankara-Turkey

**OBJECTIVE:** The aim of this study is to assess the value of microalbuminuria in the diagnosis of preeclampsia, to compare the urinary albumin secretion rate between the high risk hypertensive patients and normal pregnant subjects and to find the relationship between microalbuminuria and pregnancy outcome.

**STUDY DESIGN:** The study consisted of 40 normotensive women (control group) and 50 women in whom pregnancy was complicated by preeclampsia (study group). Liver and renal function parameters, bleeding profile, urinary microalbumin secretion rates and blood pressures were assessed. Student's t test, Mann-Whitney U test and Spearman's correlation analysis were used as statistical methods. A p value less than 0.05 was considered significant.

**RESULTS:** Mean urinary microalbumin secretion rate was significantly higher in the study group than in controls (481.54±36.36 mg/lt vs 69.13±15.92 mg/lt). Platelets, liver function parameters and serum creatinine levels did not show any significant difference between groups (p>0.05). We found no correlation among microalbuminuria, blood pressure and fetal outcome (p>0.05).

**CONCLUSIONS:** Microalbuminuria may be used in the diagnosis of preeclampsia. We found no correlation with pregnancy outcome.

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**Key Words:** Microalbuminuria, Preeclampsia, Diagnosis

Preeclampsia is a common disorder of pregnancy and a major cause of maternal and fetal morbidity and mortality.<sup>1,2</sup> The prevalence of preeclampsia was found as 20.1% and the prevalence of severe preeclampsia, eclampsia and Hellp syndrome were found as 6.4% in a study by Demir et al in 2004.<sup>3</sup> It has been said that the clinical syndrome is the manifestation of an illness which starts in early pregnancy.<sup>4</sup> Various biophysical and biochemical tests have been recommended for early diagnosis of preeclampsia and its clinical outcomes. Family history, parity, angiotensin II infusion test, rollover test, plasma fibronectin concentration and urinary calcium/creatinine ratio have been suggested.<sup>5,6</sup> Recently studies on serum  $\beta_2$ -microglobulin levels,<sup>7</sup> microtransferrinuria and microalbuminuria<sup>8</sup> have been made. A recent study on serum lipoprotein (a) levels in preeclampsia did not show an important role in the diagnosis and severity of preeclampsia.<sup>9</sup> To date there is no reliable and practical marker for preeclampsia.<sup>7</sup> The purpose of this study is to assess the value of microalbuminuria in the diagnosis of preeclampsia, to compare the urinary microalbumin excretion rates between the high risk hypertensive patients and normal pregnant subjects and to detect the value of microalbuminuria on pregnancy outcome.

Zekai Tahir Burak Women's Health Education and Research Hospital,  
Ankara, Turkey

Address of Correspondence      Emre Sinan Güngör  
Oran Sitesi 69. Sokak No: 5/9  
Onat Apt. Ankara, Turkey

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## Material and Methods

The study involved 90 women who were hospitalized in our perinatology clinic between 28-40<sup>th</sup> gestational week. Study group consisted of 50 women in whom pregnancy was complicated by preeclampsia. Control group consisted of 40 normotensive, healthy women attending for routine antenatal follow-up. The study was conducted prospectively. Preeclampsia was defined by the criteria accepted by the textbook of Williams Obstetrics.<sup>10</sup> Women were excluded from the study if they had a history of chronic hypertension, diabetes, renal disease or urinary tract infection. Demographic and clinical data were recorded from each patient. The groups were matched for age, gestational age at inclusion and parity. The examination included measurement of systolic and diastolic blood pressure and simultaneously routine analysis of serum and urine samples. Liver and renal function parameters, bleeding profile were studied from serum samples. Microalbuminuria was detected by Roche Diagnostic microalbuminuria kit with Roche Modular p-800 device by immunoturbidimetric assay technique. Data were statistically analyzed by using Student's t-test, Mann-Whitney U test and Spearman's correlation analysis. A p value < 0.05 was considered significant.

Table 1. Characteristics of study and control groups.

	Study Group (n=50)	Control Group (n=40)	p value
Age (years)	26.24±5.73	24.68±5.12	0.384
Gravida	2.36±1.91	2.06±1.43	0.597
Parity	0.96±1.36	0.87±1.36	0.847
Gestational week (weeks)	35.27±4.66	38.46±2.99	0.051

Student's t-test, p < 0.05 significant

Table 2. Blood pressure, serum albumin and urinary microalbumin levels at admission.

	Study Group (n=50)	Control Group (n=40)	p value
Systolic BP adm. (mmHg)§	149.2±19.56	114.37±6.29	<0.0001*
Diastolic BP adm. (mmHg) §	101.6±11.7	75.6±8.92	<0.0001*
Total protein (serum) (mg/dl) §	5.52±0.82	5.67±0.77	0.525
Albumin (serum) (mg/dl) §	2.77±0.45	3.03±0.40	0.048*
Microalbuminuria (mg/L)	481.54±363.68	69.13±150.92	<0.0001*

§Student's t-test, ¶Mann-Whitney U test, p<0.05 significant.

BP adm: Blood pressure at admission

## Results

The basal and pregnancy outcome characteristics of the study and control groups are summarized in Table 1. Mean ages of the women were 26.24±5.73 years for the study group and 24.68±5.12 years for the control group. Gestational ages were 35.27±4.66 and 38.46±2.99 weeks for study and control groups respectively. Neither of these were significant between two groups (p>0.05). Table 2 summarizes the blood pressure, serum total protein and albumin levels and urinary microalbumin excretion. Both systolic and diastolic blood pressures were significantly higher in the study group than in the control group (p<0.0001). Urinary microalbumin levels were significantly higher in preeclamptic group than that of normotensive group (481.54±363.68 vs 69.13±150.92 mg/Lt, p<0.0001). There was no significant difference for the results of haemoglobin, hematocrit, platelet, fasting blood glucose levels, liver and renal function parameters and bleeding profile (p>0.05). Table 3 shows the relation among blood pressure, renal function parameters, fetal outcome in terms of Apgar score and microalbuminuria. There was no significant correlation between these parameters.

Table 3. Correlation of microalbuminuria with Apgar scores, blood pressure and renal function parameters.

	Microalbuminuria	
	r	p
Apgar 1'	-0.282	0.091
Apgar 5'	-0.274	0.101
Systolic BP	-0.224	0.282
Diastolic BP	-0.284	0.168
BUN	-0.077	0.714
Creatinine	-0.270	0.192

Spearman Rank Correlation Test

BUN: Blood Urea Nitrogene

## Discussion

Microalbuminuria is defined as excretion of 20 to 200 µg/ min of albumin.<sup>11,12</sup> Persistent microalbuminuria indicates a high probability of damage of the glomerular filtration

capacity of kidney and is of great diagnostic relevance in pregnancy as a possible predictor of developing preeclampsia.<sup>8</sup> Bar et al<sup>13</sup> suggested that high risk patients in whom proteinuria develops usually have a microalbuminuric phase several weeks before and this test has some predictive value for severe disease. In the same study, a less favorable maternal and perinatal outcome were detected in cases where microalbuminuria developed in the early third trimester.<sup>13</sup> On the other hand Lopez- Espinoza et al<sup>14</sup> could find no evidence that gross proteinuria is preceded by a gradual increase of microalbuminuria and women with mild preeclampsia superimposed on chronic hypertension did not differ in degree of microalbuminuria developed in the early third trimester.

Patemoster et al<sup>4</sup> found albumin excretion rate to be the best predictive test for preeclampsia in hypertensive pregnant women giving a higher positive predictive value of 87.5% and specificity of 98.9% respectively. On the other hand, Büyükören et al found a sensitivity of 21% and specificity of 94% for microalbuminuria as a screening test in preeclampsia<sup>15</sup>

In this preliminary study significantly higher urinary microalbumin levels have been found in preeclamptic patients. But these controversial results in other studies promotes the studies on the clinical value of microalbuminuria in early pregnancy for the prediction of preeclampsia. In contrast to some studies which revealed a less favorable perinatal outcome in patients with microalbuminuria, we could not find a significant correlation between microalbuminuria and pregnancy outcome in terms of Apgar scores.

North et al<sup>16</sup> found that microalbuminuria correlated with diastolic but not with systolic blood pressure. The level of diastolic blood pressure has been reported to be associated with microalbuminuria<sup>17,18</sup> but in many studies, particularly in diabetic and hypertensive populations, microalbuminuria correlates with systolic rather than diastolic blood pressure.<sup>16</sup> But in the present study, we could not find any correlation neither with systolic nor with diastolic blood pressure and microalbuminuria.

In conclusion, we found significantly higher urinary microalbumin excretion rates in preeclamptic patients. Microalbuminuria may be used in the diagnosis of preec-

lampsia. But we could not find significant relation between microalbuminuria and blood pressure and fetal outcome. Further studies with greater populations in early pregnancy are needed to find out the predictive value of microalbuminuria in preeclampsia.

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