

## Levels of microalbuminuria in prediction of pre-eclampsia: A hospital based study

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### Abstract

**Introduction:** Pre-eclampsia (PE) is defined as the new onset of hypertension and proteinuria during the second half of pregnancy. In the Indian scenario, it accounts for 44.44% of all cases of hypertensive disorders of pregnancy. Microalbuminuria is one the classic signs of pre-eclampsia.

The aim of the study was to determine microalbuminuria as predictor of pre-eclampsia.

**Methods:** A total of 145 pregnant women in their second trimester of pregnancy were included in the study. From all these subjects, clean catch morning urine sample (5ml) was collected in a sterile container. Urinary Creatinine and urinary microalbumin was estimated by kit based method on Vitros Fusion 5.1 FS fully automated analyzer from Ortho Clinical Diagnostic USA. The statistical significance of difference between mean values was assessed by Student's unpaired t-test.

**Result:** Pregnant women who developed pre-eclampsia were having significantly higher micro albumin level and Albumin Creatinine Ratio as compared to normotensive pregnant women.

**Conclusion:** To determine microalbuminuria as predictor of pre-eclampsia, further detailed study is required in large group of population.

**Keyword:** Pre-eclampsia, Microalbuminuria, Albumin Creatinine Ratio, BP, Pregnancy

### Introduction

Pre-eclampsia (PE) is a clinical syndrome defined as the new onset of hypertension and proteinuria during the second half of pregnancy. This clinical condition is diagnosed when the blood pressure at or above 140/90 mmHg, occurring on two occasions at least 6 hours apart, associated with proteinuria greater than 300mg/24 hours or greater than 1 gm/l in a random sample, after 20 weeks of gestation<sup>1</sup>. In developing nations, the incidence of the disease is reported to be 4%-18% and is the second most common obstetric cause of mortality accounting for 40,000 maternal deaths annually<sup>2,3</sup>. In the Indian scenario, the incidence of preeclampsia is 5.47% in primigravida and 2.8% in multigravida. It accounts for 44.44% of all cases of hypertensive disorders of pregnancy<sup>4</sup>. Proteinuria and hypertension are the most common manifestations of pre-eclampsia. PE is not only common and dangerous for both mother and baby, but also unpredictable in onset and progression, and is incurable constituting 12% to 18% of pregnancy related maternal deaths<sup>5</sup>.

Microalbuminuria is characterized by urinary albumin excretion above normal levels in the absence of clinically detectable nephropathy<sup>6,7,8</sup>. Microalbuminuria is noted to be present if urinary albumin is within the range of 30-300 mg/24 hrs<sup>9</sup>. Microalbuminuria is one the classic signs of pre-eclampsia. The presence of microalbuminuria in some otherwise symptom-free patient confirms that changes in renal function are present in whom pre-eclampsia would eventually develop. Early pregnancy levels of microalbuminuria can be used as predictors of pre-eclampsia with high negative predictive value<sup>10</sup>. Persistent microalbuminuria indicates a high probability

of damage of the glomerular filtration capacity of the kidney and is of great diagnostic relevance in pregnancy as a possible predictor of developing PE.

Many researches have been done to find tests that would predict the risk of developing PE before the classical triad of symptoms appear<sup>11</sup>. But the predictive ability of individual test has varied widely and many tests simply detect early disease. It is clear that no test reliably predicts pre-eclampsia<sup>12</sup>. Further studies are going on to detect an effective and practical early predictor of pre-eclampsia, which will be of 'gold standard'<sup>13</sup>.

### Material and Methods

The present study was conducted by Department of Biochemistry, on pregnant females attending to antenatal clinic of Obstetrics and Gynecology department in Chatrapati Shivaji Subharti Hospital, Subharti Medical College, Meerut, UP, after obtaining ethical clearance from the institutional ethical committee. A total of 145 pregnant women in their second trimester of pregnancy were included in the study. Patients with acute anxiety and stress or those undergoing severe exercise, patients with eclampsia, uncontrolled hypertension, diabetes mellitus, gestational diabetes mellitus, endocrine disorders and patient suffering from any acute or chronic illness were excluded.

All study subjects were under regular follow up until delivery. Specific note was made for the development of pre-eclampsia/eclampsia during antenatal period and/ or at the time of delivery.

From all these subjects during their second trimester of pregnancy, clean catch morning urine

sample (5ml) was collected in a sterile container and was preserved at -20°C until biochemical analysis was performed.

Estimation of serum/urinary Creatinine and urinary microalbumin was done using kit method by Vitros Fusion 5.1 FS, fully automated analyzer from Ortho Clinical Diagnostic USA. The cut-off value of Albumin Creatinine Ratio (ACR) from Microalbuminuria was taken as 30- 300 µg/mg of Creatinine.

Data were expressed as mean±SD. The statistical significance of difference between mean values assessed by Student's unpaired t-test. The "p" value of <0.05 was considered as significant.

## Results

In this clinical study all 145 pregnant women in 12-36 weeks of gestation age were followed up till delivery. Out of this total number, 107 pregnant women remained normotensive till their delivery. Their systolic BP, diastolic BP, Microalbumin and ACR were in the normal reference range (Table 1). Remaining 39 pregnant women developed pre-eclampsia in their third trimester of pregnancy. Their mean systolic BP was 151.15±10.61, diastolic BP was 99.76±4.92, Microalbumin level was 66.59±48.76 and ACR was 81.14±54.29 respectively. Pregnant women who developed pre-eclampsia were having significantly higher micro albumin level and ACR as compared to normotensive pregnant women (p value <0.05). It was a further notice that the women who developed pre-eclampsia were mostly in the age group of 25 to 36 years.

**Table 1: Values of different parameters in normotensive and pre-eclamptic pregnant women**

	Normotensive	Pre-Eclampsia	p value
Number (%)	107(73.79)	39(26.89)	<0.05
Mean gestational age	19.5±2.84	28.75±3.6	
Mean Systolic BP(mmHg)	113.34±12.48	151.15±10.61	
Mean diastolic BP(mmHg)	78.5±4.68	99.76±4.92	
Microalbuminuria	19.4±5.71	66.59±48.76	
Mean ACR	24.46±11.85	81.14±54.29	

\*p value<0.05 considered as significant

**Table 2: Age wise distribution of parameters**

Age group	Mean Systolic BP (mmHg)	Mean diastolic BP (mmHg)	Microalbuminuria	Mean level of ACR
18-26	102±11.24	84±6.1	22.34±9.6	23.46±15.85
27-36	136±17.35	95±12.8	57.59±48.76	71.14±44.29

**Table 3: Occurrence of pre-eclampsia in primi and multigravida**

Pre-eclampsia	Primigravida	Multigravida
39(26.89)	16(41.02)	23(58.97)

## Discussion

Various studies have been conducted to see the association of micro albumin with outcome of pregnancy. In our study, we have taken 145 pregnant females in age group of 19-36 years and found that levels of microalbumin and ACR were significantly higher in women who developed pre-eclampsia in her later weeks of gestation. It was further noticed that the occurrence of preeclampsia was higher in multigravida as compared to primigravida and blood pressure was also higher in multigravida.

It has been established in recent years that pre-eclampsia is associated with widespread vascular dysfunction both in placenta and mother<sup>14</sup>. Various biochemical markers found to be raised in case of micro-vascular damage and among these microalbumin is commonly used because of its cost effectiveness and ease of estimation. Salako et al. found that microalbuminuria might be a good predictor of this condition with a high sensitivity but a low positive predictive value<sup>15</sup>. Bar et al. have reported in their study that microalbuminuria early in the third trimester of pregnancy is a good predictor of hypertensive complications in pregnancy<sup>16</sup>. Poonet et al. proposed that the appearance of clinical proteinuria in preeclampsia (determined during 11-13 weeks of pregnancy) in 55% of normal pregnancies and in only 75% of pregnancies that complicated by preeclampsia<sup>17</sup>. Gangaram et. al reported in their study about the comparison of diagnostic value of the micro ACR with that of 24-h urine protein test when screening for proteinuria among pregnant women with hypertension. They proposed that the value of tow tests in the context was same and concluded that measurement of the micro ACR may be a good substitute for a random urine protein test<sup>18</sup>. Chhabra et al found that values of micro albumin around 18 weeks of gestation seemed useful, especially in primigravida<sup>19</sup>. K.K. Fatema et al reported in their study that patients having microalbuminuria will develop preeclampsia eventually<sup>20</sup>. It is clear that more clinical studies are needed to establish the usefulness of micro-albumin in prediction of pre-eclampsia.

## Conclusion

Our study was conducted in a small group of pregnant females, so to establish the association between microalbuminuria and occurrence of preeclampsia a further detailed study required in a large group of population along with measurement of other established marker.

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