



## Spot Urine Protein/Creatinine Ratio in Predicting the Severity of Pre Eclampsia and Maternal and Fetal Outcome

### KEYWORDS

Pre eclampsia, Severity, Spot Protein:Creatinine Ratio

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**ABSTRACT** *Pre eclampsia is a multi system disorder of pregnancy and perurperium characterized by hypertension and proteinuria. It complicates approximately 5-8% of pregnancies (ACOG 2002; Sibai et al 1997). It is one of the major causes of maternal, perinatal morbidity and mortality. Worldwide an estimated 289,000 women die every year from pregnancy related causes. Pre eclampsia and eclampsia contributes to 14% of all maternal deaths in developing countries (WHO 2014). The primary aim in the management of pre eclampsia is to predict the severity of pre eclampsia early, and prevent its adverse outcome by appropriate management. One of the methods to predict the severity of pre eclampsia is spot urine protein: creatinine ratio. The present study was undertaken to assess the efficacy of spot urine protein: creatinine ratio in assessing the severity of pre-eclampsia and its influence on maternal and fetal outcome.*

### INTRODUCTION:

Pre eclampsia is a multi system disorder of pregnancy and perurperium characterized by hypertension and proteinuria. It complicates approximately 5-8% of pregnancies (ACOG 2002; Sibai et al 1997). It is one of the major causes of maternal, perinatal morbidity and mortality.

Worldwide an estimated 289,000 women die every year from pregnancy

related causes (WHO2014). Pre eclampsia and eclampsia contributes to

14% of all maternal deaths in the developing countries (WHO 2014).

With increasing proteinuria there is an increased risk of adverse maternal and fetal outcome (Brown et al 1995). The primary aim in the management of pre eclampsia is to predict the severity of pre eclampsia early, and prevent its adverse outcome by appropriate management.

Various methods have been tried to predict the severity of pre eclampsia and one such method is spot urine protein: creatinine ratio. The present study was undertaken to assess the efficacy of spot urine protein: creatinine ratio in assessing the severity of pre-eclampsia and its influence on maternal and fetal outcome.

Spot urine protein: creatinine ratio is economical enough to perform in all cases of preeclampsia and is as effective as 24 hour urinary protein: creatinine ratio in assessing significant proteinuria (Wang, M et al)

### MATERIALS AND METHODS:

This prospective clinical study was conducted at Government Kasturbha Gandhi Hospital, Madras Medical College, Chennai for 19 months from January to August on 300 patients. The study was approved by hospital ethical committee

### INCLUSION CRITERIA:

1. Patient with BP >140/90
2. Singleton pregnancy
3. GA 20-34 weeks
4. No known predisposing factors for pre-eclampsia
5. No previous history of cardiac/renal disease including hypertension
6. No past history of pre-eclampsia/eclampsia
7. Patient with significant proteinuria >2+ in dip stick

### EXCLUSION CRITERIA:

1. GA <20 wks or >35 wks
2. Known hypertensive
3. Known renal pathology
4. Known patients on immuno therapy
5. Immuno compromised individuals
6. Known epileptic patients
7. Multiple pregnancies
8. Patients with past history of pre eclampsia/eclampsia

### METHODS:

300 antenatal mothers attending the AN clinic at Govt. Kasturba Gandhi Hospital, Chennai who showed BP of more than 140/90 on at least two occasions were included in the study based on the inclusion and exclusion criteria described above. The patients so selected for the study were explained about the study and their consent obtained.

They were instructed to collect clean catch mid stream urine in clean test tube and it was checked for protein with dip-stick method

Protein Creatinine Ratio(PCR) was analysed in all those pregnant women in whom dip stick method revealed protein levels of 2+ or more. All other routine investigation like Complete Blood Count (including platelet count), renal and liver function test were done.

Those with diastolic BP>100 mm Hg were started on appropriate antihypertensives (T.Nifedepine 10mg or

T.Labetalol 100mg) and the dose titrated. All 300 women were followed up to delivery and also upto 6 weeks post partum.

#### The following factors were considered as worsening of the situation:

1. Severe hypertension >160/110 mm Hg
2. Abruption
3. Renal insufficiency- creatinine >1.2 mg
4. Liver damage - High AST,ALT >70IU/L
5. Cerebral irritation hyper reflexia with clonus requiring magnesium sulphate
6. Thrombocytopenia

#### RESULT:

Most of the women were in age group 20-25 years 65% of cases were primi gravida

#### SPOT URINE PROTEIN CREATININE RATIO n = 300

Sl No	Spot Urine P/C mg/mmol	No of cases	Percentage	No. of cases with maternal & fetal complications	Percentage
1	< 30	82	27.3%	3	3.7%
2	30 – 100	146	48.7%	94	64.4%
3	> 100	72	24%	56	77.8%

64.4% of patients with spot urine protein creatinine ratio 30-100 mg per mmol and 77.8% patients with spot urine creatinine ratio > 100 mg /mmol had maternal and fetal complications

#### SPOT P/C AND MATERNAL COMPLICATIONS

MATERNAL COMPLICATION	Spot urine P /C		
	<30mg/mmol	30-100mg/mmol	>100mg/mmol
Abruption		5	17
Renal dysfunction		15	2
Liver dysfunction	1	13	2
Eclampsia		1	19
HELLP syndrome		10	1
Severe hypertension	2	52	18

Eclampsia and abruptio were more common when spot urine creatinine ratio was > 100 mg/mmol

#### SPOT P/C AND FETAL OUTCOME

	Spot urine P /C		
	<30mg/mmol	30-100mg/mmol	>100mg/mmol
Intrauterine death		6	18
Small for gestational age	2	22	2
Preterm delivery		12	20
Fetal distress	1	56	19

Intra uterine death was more common when spot urine creatinine ratio was > 100 mg/mmol

Statistical analysis also showed a p value of **0.05** for spot

urine protein creatinine ratio for maternal complication Similarly the p value for fetal complication was **0.01**.

#### DISCUSSION:

In this study, the incidence of pre eclampsia/eclampsia was more in primi gravid mothers . When the spot urine protein creatinine ratio was high (30-100 mg per mmol) 64.4% of patients had maternal and fetal complications. Similarly, when the spot urine protein creatinine ratio was > 100 mg /mmol, 77.8% Of patients had maternal and fetal complications. This is in concurrence with other studies like that of Price CP , Newall RG et al where in spot urine protein creatinine ratio was found to have higher specificity, sensitivity and positive predictive value when compared to 24 hour urinary protein. The 24 hour urinary protein had a better negative predictive value.

It was observed that when the protein: Creatinine ratio was less than 30 mg/mmol, there was only one patient who developed hepatic dysfunction and only 2 patients progressed to severe hypertension. This is in contrast to 44 women who developed complications like abruptio, renal and hepatic dysfunction, HELLP syndrome, Eclampsia etc and 52 patients progressed to severe hypertension when protein: Creatinine ratio was between 30 and 100 mg/mmol. The complications increased further when the protein: Creatinine ratio was more than 100 mg/mmol in which 41women developed complications like abruptio, renal and hepatic dysfunction, HELLP syndrome, Eclampsia etc and 18 patients progressed to severe hypertension.

Increase in blood pressure during pregnancy has been shown to increase the incidence of adverse fetal outcome also. (Roberts C L, et al 2005). This study also shows that all mothers delivered live babies with 10 preterm deliveries when the BP was <150 mm of Hg systolic and <100 mm of Hg diastolic. This is in contrast to outcome when the BP was 160-170/11-120 mm of Hg, wherein there were 8 intrauterine deaths and 2 preterm deliveries.

There were no maternal deaths in this study.

Hence, there is a need to develop a reliable, easily replicable test for identifying pre eclampsia early to prevent adverse maternal and fetal outcome. Though Dipstick method is being used as a routine test in most of the centres, according to a prospective study conducted by Phelan LK , Brown MA et al, dipstick proteinuria should be confirmed with further tests such as spot urine protein: Creatinine ratio. Dipstick test has higher false negative rate .That viable alternative is being provided by spot urine protein:creatinine ratio. As mentioned earlier, the spot protein:creatinine ratio also has better specificity and sensitivity when compared to 24 hour urinary protein also. Routine use of 24 hour urinary protein is also not feasible due to practical problems involved.

Hence, spot Protein: Creatinine ratio is a viable test for the early detection of pre eclampsia.

#### CONCLUSION:

In conclusion, Preeclampsia is a multi organ dysfunction unique to human pregnancy and is a major contributor to maternal and perinatal morbidity and mortality. Increasing proteinuria in patients with preeclampsia is associated with higher incidence of maternal and fetal complications (BROWN et al 1995). Spot urine protein:creatinine ratio is a simple test that can be done in all levels of care and is economical enough to perform in all cases of pre eclamp-

sia. Spot urine pc is as effective as 24 hour urinary pc in assessing significant proteinuria (Wang M et al). This study also revealed spot urine protein : creatinine ratio to be statistically significant in predicting the severity of preeclampsia and maternal and fetal complications Hence spot urine protein : creatinine ratio can be a viable alternative to the existing dipstick test.

#### REFERENCES:

1. Sibai BM, M Ewell, RJ Levine et al., 1997. Risk factors associated with pre eclampsia in healthy nulliparous women: The calcium for pre eclampsia prevention (CPEP) study group. *Am Journal of Obstetrics and Gynaecology* 177 :1003 – 1010
2. ACOG Practice Bulletin 2002. Diagnosis and management of pre eclampsia and eclampsia 33 ; 1 – 14
3. Saving Mothers' Lives, World Health Organisation Infographics WHO 2014.
4. Brown M, Buddle M. The importance of non proteinuric hypertension in pregnancy. *Hypertensive pregnancy* 1995 ; 14(1) : 57 – 65
5. Xin G, Wang M, Jiao LL, Xu GB, Wang HY. Protein-to-creatinine ratio in spot urine samples as a predictor of quantitation of proteinuria. *Clin Chim Acta*. 2004;350:35–39.[PubMed]
6. Use of protein:creatinine ratio measurements on random urine samples for prediction of significant proteinuria: a systematic review., Price CP<sup>1</sup>, Newall RG, Boyd JC, *Clin Chem*. 2005 Sep;51(9):1577-86. Epub 2005 Jul 14
7. The accuracy of reporting of the hypertensive disorders of pregnancy in population health data., Roberts CL<sup>1</sup>, Bell JC, Ford JB, Hadfield RM, Algert CS, Morris JM, *Hypertens Pregnancy*. 2008;27(3):285-97. doi: 10.1080/10641950701826695
8. A prospective study of the impact of automated dipstick urinalysis on the diagnosis of preeclampsia., Phelan LK<sup>1</sup>, Brown MA, Davis GK, Mangos G., *Hypertens Pregnancy*. 2004;23(2):135-42