

QUANTIFICATION OF PROTEINURIA IN PRE ECLAMPSIA USING PROTEIN AND CREATININE RATIO IN RANDOM URINE SPECIMEN

R. Padmaja¹, M. L. Rajeshwari², Swetha³

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ABSTRACT: Hypertensive disorders complicating pregnancy are common and form one of the deadly triad along with haemorrhage and infection that results in much of the maternal morbidity and mortality related to pregnancy. Proteinuria is essential for the diagnosis of preeclampsia. As the Proteinuria increases, the likelihood of complications also increases and hence a rapid and accurate detection and quantization of Proteinuria is essential for the management of hypertensive pregnant women. The protein creatinine ratio in a single urine specimen has been used for the rapid and accurate detection of proteinuria in hypertensive pregnant women as it avoids collection errors and gives physiologically more relevant information. **OBJECTIVES OF THE STUDY:** To study the clinical profile of preeclampsia patients. To assess the degree of Proteinuria by 24 hour urine protein and spot urine protein Creatinine ratio in the study population To study if the spot urine protein and creatinine ratio will provide accurate quantification of proteinuria in hypertensive pregnant women. **MATERIALS AND METHODS:** This was observational study it was conducted in King George Hospital for a period of one year & 60 patients were included for the study. **RESULTS:** In the present study: spot urine p/c ratio sensitivity 100%, specificity 66.67%, and positive predictive value of 98.27% added. **CONCLUSION:** quantization of proteinuria, when properly interpreted, can provide valuable information.

KEYWORDS: Pre-eclampsia, Protein creatinine ratio, Maternal morbidity, Infection haemorrhage.

INTRODUCTION: In pregnancy Proteinuria is detected and measured either by visual dipstick urine analysis or by the 24 hrs urinary protein measurement. The visual dip stick urinalysis in recent studies has been found to be inaccurate, giving a high number of false positives and false negatives. The 24 hrs. Urinary collection has been the standard in most places for quantifying Proteinuria. Though a reliable indicator, it has the disadvantage of being a cumbersome and time consuming process, for both the patient and laboratory; it is subjected to collection error; requires good patient compliance and there is a delay of 24 hrs from the time of collection till the diagnosis is made. Hence, there is a need to evaluate other tests which can be used to quantify the Proteinuria accurately and rapidly and at the same time overcome the limitations of the routinely performed tests.

MATERIALS AND METHODS: This observational study was conducted in King George Hospital for a period of one year where 60 patients were included for the study who are attending antenatal clinic, between October 2012 and October 2013.

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Inclusion Criteria: Pregnant women with pre eclampsia. Were included for the study.

Exclusion Criteria: Pre-existing renal disorder patients were excluded from the study.

PROCEDURE: All the patients satisfying the above criteria were selected for the study. The tests were carried out in hospitalized, non-ambulatory patients.

1. A detailed history was taken, general physical and systemic examination including the Obstetric examination. Per speculum examinations were done to look for any evidence of vaginal infection clinically.
2. If urine microscopy suggested the presence of infection a urine culture was done.
3. A qualitative test for urinary protein was carried out on a random sample of urine using the dipstick method. Protein by the dipstick method was graded as follows: Traces = 300 mg/ dl 1+ = 500 mg/dl 2+ = 1gm/dl 3+ = 2gms/dl 4+ = 3gms/dl.
4. The test was repeated on an additional sample of urine immediately and if the subsequent tests showed 1+ or more, quantitative tests for proteinuria were carried out.
5. The tests were carried out as follows: The patients were instructed to collect the 24 hours urine starting from the second urine sample in the morning (i.e.; after discarding the first morning specimen) till the first urine sample the next day morning. A single voided urine specimen was obtained soon after the 24 hour urine collection, before midday.
6. The samples were sent to the Biochemistry laboratory where:
 - a) Urine protein was measured by the UCFP method (Urinary-Cerebrospinal fluid protein), which is an adaptation of the pyragallo red molybdate method. The test was performed on an automated analyser.
 - b) Urine creatinine was measured by the CREA method which is a modification of the Jaffe's reaction. The test was performed on an automated analyser 46yt.
7. The urine protein and creatinine ratio was obtained by dividing the urine protein concentration (mg /dl) by the urine creatinine (mg/dl).
8. Normal values for protein excretion:

The data thus collected were analyzed using appropriate statistical methods. The mean and standard deviations were computed. The statistical test used for analysis were

 - Pearson's Correlation Coefficient which is expressed as-r.
 - A value of $p < 0.05$ has been considered to be statistically significant.

Patients were categorized as severe preeclampsia if any of the following criteria were met:

- Diastolic BP ≥ 110 mmHg or higher.
- Proteinuria persistent $\geq 2+$.
- Headache, vomiting, epigastric pain, visual disturbances, brisk deep tendon reflexes, oliguria, presence of IUGR.
- Raised liver enzymes, thrombocytopenia, raised serum creatinine.

Mild pre eclampsia was a BP $\geq 140/90$ and $< 150/100$ mmHg with 1+ protein by Dipstick.

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INVESTIGATIONS:

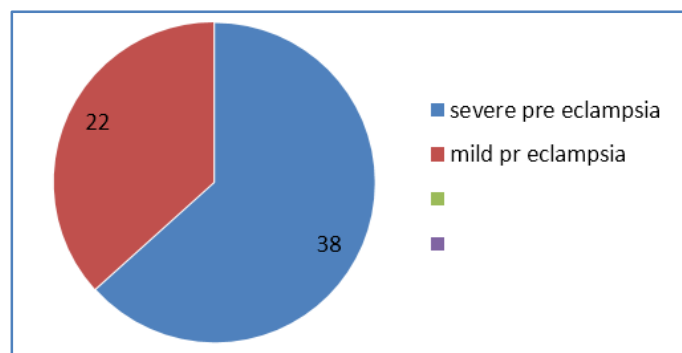
- HB%, PCV, platelet count.
- Liver function tests –SGOT, SGPT, ALP, serum bilirubin.
- Renal function tests-Blood urea, serum creatinine, serum uric acid.
- Oral GTT.
- Urine albumen/sugar/microscopy.
- 24 Hrs urine protein.
- Spot protein /creatinine ratio.
- Dipstick urine protein.
- Bleeding time/ clotting time, -HIV/HBsAg, -BGT & typing.

RESULTS: The baseline characteristics of the study population is as follows;

Severity	Frequency	
Mild preeclampsia	22	37%
Severe pre eclampsia	38	63%
Total	60	100%

Table 1: Distribution of preeclampsia subjects based on severity

In our study 22 (37%) had mild preeclampsia and 38(63%) had severe preeclampsia.



Graph 1

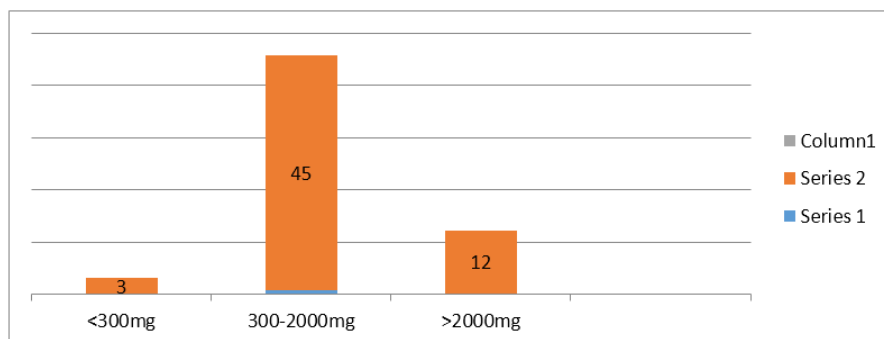
24 hrs urine protein	No. of patients	Percentage
<300 mg in 24 hrs	3	5
300-400mg	45	75
>2000 mg	12	20
SPOT urine p/c ratio		
<0.3	2	3
0.3-3	51	85
>3	7	12

Table 2: Distribution of subjects based on degree of proteinuria

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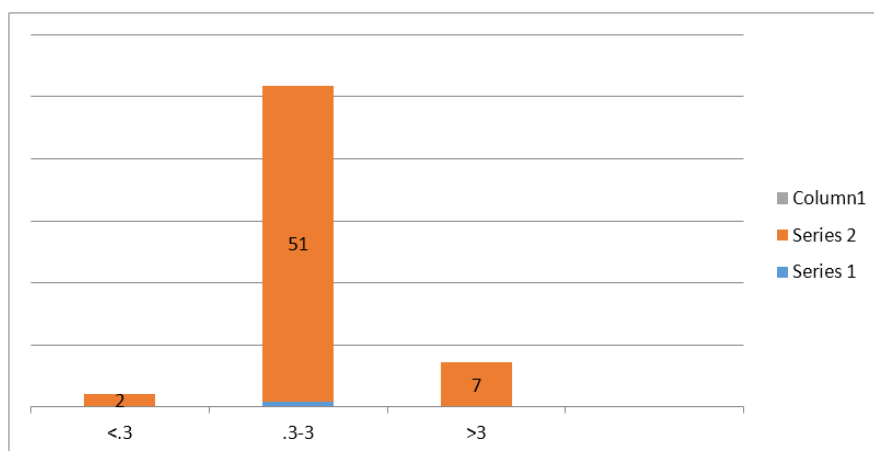
In our study, 3 patients (5%) had proteinuria <300mg, 45(75%) had proteinuria between 300-2000mg and 12(20%) had proteinuria >2000mg based on gold standard test 24hour protein compared to spot p/c rati, 2 pts (3%) had p/c ratio <0.3, 51pts (85%) had p/c ratio 0.3-3, and 7 pts (12%) with p/c ratio >3.

24 hour urine protein:



Graph 2

SPOT URINE P/C RATIO:



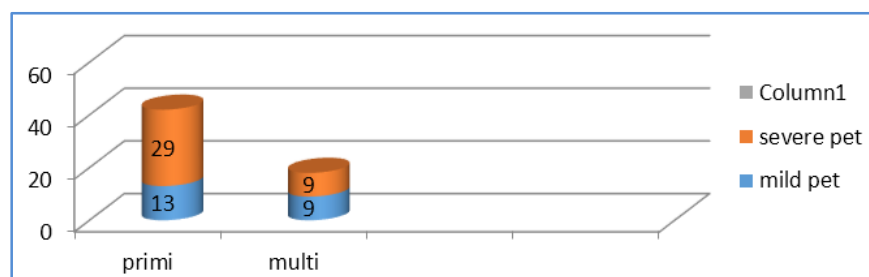
Graph 3

	Mild pre eclampsia	Severe pre eclampsia	N
Primi	13(31%)	29(69%)	42(70%)
Multi	9(50%)	9(50%)	18(30%)
Total	22	38	60

Table 3: Parity distribution of subjects

In our study it was observed that the incidence of preeclampsia was higher in primigravidas 42(70%) than in multigravidas 18(30%).

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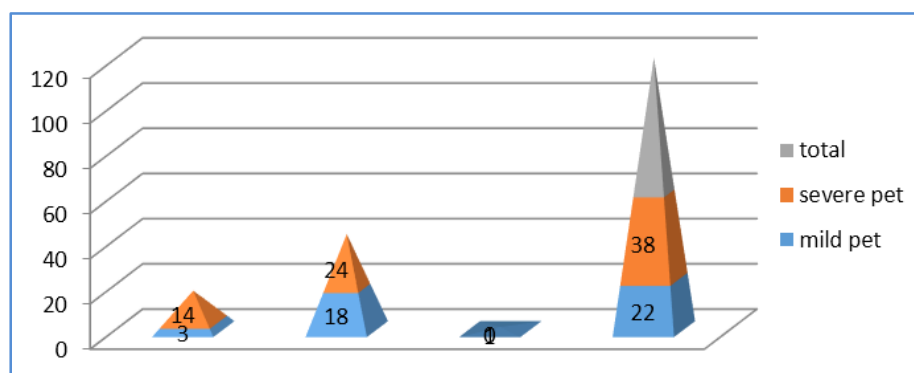


Graph 4

Age in years	Mild pre eclampsia	Severe pre eclampsia	Total
<20	3	14	17 (28%)
21-30	18	24	42 (70%)
>30	1	0	1(2%)
Total	22	38	60

Table 4: Age distribution of subjects

It was observed that among 60 subjects studied; majority 42 (70%) of them were in the age group of 21-30 years. In patients with age <20 years 82% had severe preeclampsia.

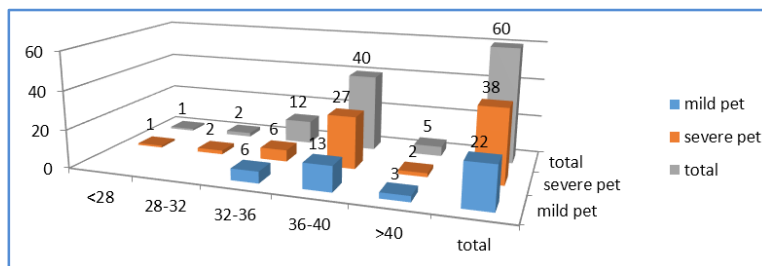


Graph 5

Gestational age in weeks	Mild pre eclampsia	Severe pre eclampsia	Total
<28	-	1	1(2%)
28-32	-	2	2(3%)
32-36	6	6	12(20%)
36-40	13	27	40(67%)
>40	3	2	5(8%)
Total	22	38	60

Table 5: Distribution of subjects based on period of gestation

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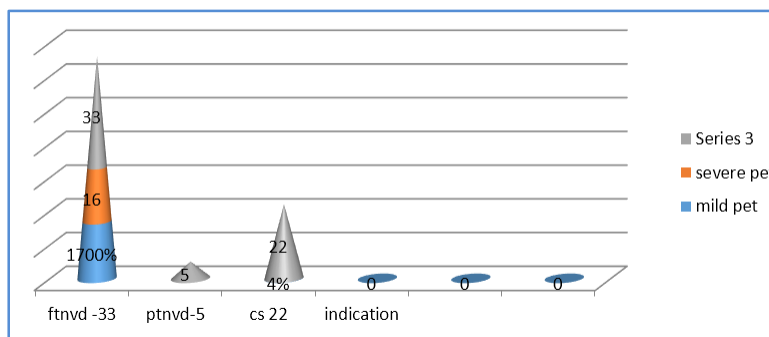
Graph 6

Out of 60 subjects studied, majority of 40 (67%) were in the gestational age of 36-40 weeks. Severe preeclampsia was also found to be the most common in this period of gestation 27 cases (68%). It was observed that the earlier the onset of disease in pregnancy the more severe it is.

Mode of delivery	Mild pre eclampsia	Severe pre eclampsia
FTNVD -33(55%)	17	16
Spontaneous -	10	3
Induced -	7	13
PretermVD 5(8%)	1	4
Spontaneous	1	0
Induced	0	4
C S. -22(37%)	4	18
Indication for C/S	Post c/s PROM 2 CPD -1 GDM and Hypothyroid -1	Only severe PE -6 Severe PE associated abruption-2 CPD -2 Fetal distress -4 Breech -1 PROM -1 Post C/S -2

Table 6: Distribution of subjects based on mode of delivery

Of the 60 subjects 22(37%) of them undergone caesarean section, commonest indication being severe preeclampsia and associated fetal distress. 5 (8%) of subjects had a preterm delivery.

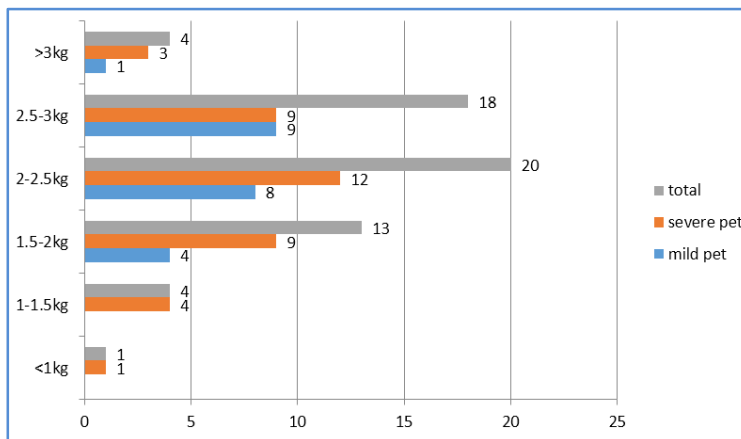


Graph 7

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Birth weight in kg	Mild pre eclampsia	Severe pre eclampsia	Total
<1 kg	-	1	1
1-1.5 kg	-	4	4
1.5-2 kg	4	9	13
2-2.5kg	8	12	20
2.5-3 kg	9	9	18
>3kg	1	3	4

Table 7: Distribution of subjects based on fetal outcome birth weight



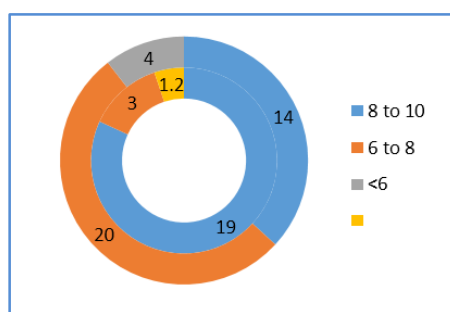
Graph 8

Of the 60 subjects delivered at our hospital, 33% had birth weight between 2-2.5 kgs, one baby was still born and 3 babies died in ICU in view of low apgar and preterm. The perinatal outcome in women with severe preeclampsia was poor with increased incidence of

IUGR, LBW, preterm births, meconium stained liquor and requiring higher need for NICU admission.

Apgar score	Mild pre eclampsia	Severe pre eclampsia
8-10	19	14
6-8	3	20
<6	-	4

Part B: Apgar score at birth



Graph 9

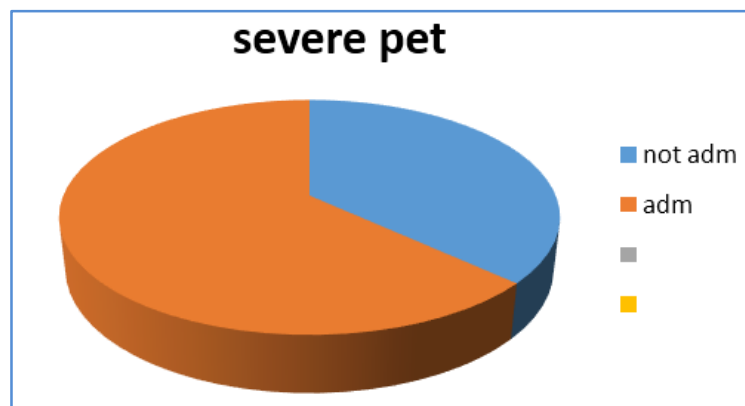
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Liquor	Mild pre eclampsia	Severe pre eclampsia
Clear	19	21
Meconium stained	3	15
Blood stained (abruption)	-	2
Other	-	-
Oligamnios	-	2
polyhydramnios	1	-

Part C: State of liquor

NICU admission	Mild pre eclampsia	Severe pre eclampsia
Not admitted	18	14
Admitted	4	24
Causes;		
Meconium	2	11
Low apgar	-	3
LBW	2	4
IUGR	-	4
Preterm	-	2

Part D: N.I.C.U admission

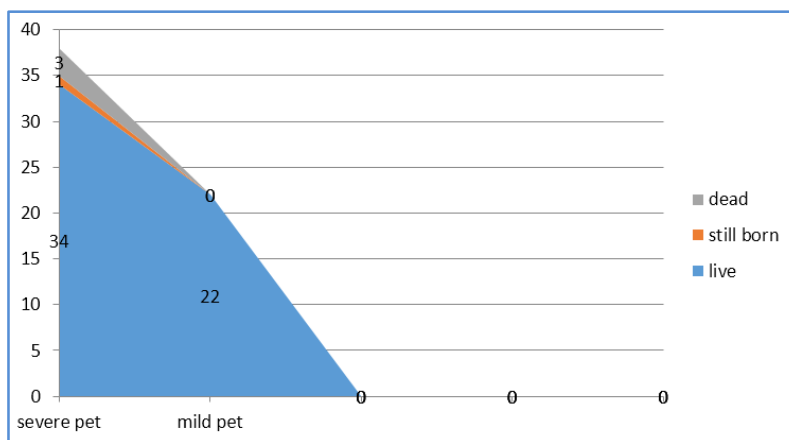


Graph 10

	Live	Still born	Dead
Severe pet	34	1	3
Mild pet	22		

Part E: Fetal outcome

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Graph 11

Mild pre eclampsia	Severe pre eclampsia
Anemia-1	Anemia – 1
GDM and Hypothyroid -1	Post ASD -1
GDM-1	Rh –ve 2
Jaundice -1	Jaundice -1
Blood transfusion -1	Antepartum eclampsia -4
Platelets -1	Post-partum eclampsia -3
	h/o blood transfusion -4
	platelets -2
	FFP -1

Table 8: Associated medical conditions

Of the 60 patients with preeclampsia, 7 patients developed eclampsia, 2 patients had abruption and 2 cases developed partial HELLP syndrome.

Variable	Mean	Standard deviation
24 hrs urine protein	1645.72/24 hrs	2098.43
Spot urine protein ceatinine ratio	1.991	2.463

Table 9: Correlation coefficient between 24 hour urine protein and spot urine protein creatinine ratio

Correlation coefficient $r = 0.906$ ($pvalue < 0.001$).

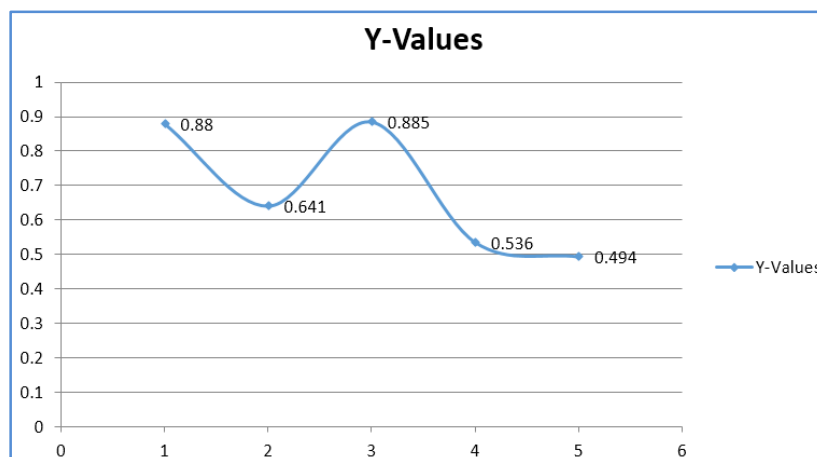
For n number of subjects $n = 60$.

Degree of freedom $= n - 2 = 58$.

At 58 degrees of freedom table value $= 0.408$ at p value < 0.001 , and observed value $= 0.906$.

It implies that there is a good correlation between 24hrs urine protein and spot urine protein creatinine ratio which is significant at p value < 0.001 in 60 patients with preeclampsia.

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Graph 12

This graph shows the distribution of 24hr random urine protein and spot urine protein creatinine ratio in patients with preeclampsia.

The central line is the best fit due to regression. The overall correlation coefficient (r) between 24 hrs urine protein and spot protein creatinine ratio $r = 0.906$ at $p \text{ value} < 0.001$,

1. When 24 hour urine protein values were $< 3\text{gms}$, spot p/c ratio values were < 3 - in the above graph all the observations are clustered around this range which has a good correlation coefficient of $r = 0.641$ with $p \text{ value} < 0.001$.
2. When 24 hour urine protein values were $> 3\text{gms}$, spot p/c ratio values were along the line but not clustered, the correlation coefficient $r = 0.88$ at value < 0.01 , it implies that even at higher ranges of proteinuria though significance decreases, a fair correlation exists between 24 hour urine protein and spot p/c ratio.

24 hrs urine protein	N	Correlation coefficient r	P value
$> 3\text{gm}$	7	0.88	< 0.01
$< 3\text{gm}$	53	0.641	< 0.001
$> 2\text{gm}$	12	0.885	< 0.001
$< 2\text{gm}$	48	0.536	< 0.001
300-2000gm	45	0.494	< 0.001
$< 300\text{mgs}$	3	-0.87	> 0.1

In the present study it was observed that with proteinuria $< 300 \text{ mg}$ a negative correlation exists between 24 hour urine protein and spot p/c ratio. This observation can be explained by the fact, that, the numbers of patients in this range of proteinuria are less and also in the exclusion criteria those patients with dipstick $< 1+$ (like traces and negative) is excluded from the study.

Mild pre eclampsia n=22	Mean	Standard deviation
24 hr urine protein	745.18	425.118
Spot urine protein creatinine ratio	.845	0.48
Severe pre eclampsia n=38		
24 hr urine protein	2167.1	2481.2

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Spot urine protein creatinine ratio	2.65	2.84
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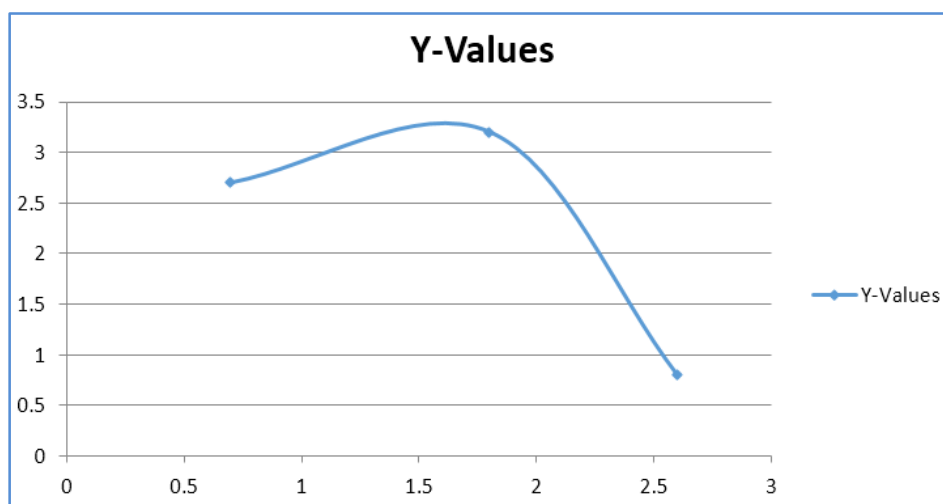
Table 10: Correlation coefficient between 24 hour urine protein and spot urine protein creatinine ratio based on severity

Severity	R	P VALUE
Mild pet n=22	.801	<.001
Severe pet n=38	.895	<.001

Correlation co-efficient R

- a) For n number of subjects with mild preeclampsia n=22.
 Degree of freedom=n-2=20.
 At 20 degrees of freedom table value =0.652 at pvalue<0.001, and observed value =0.801.
 It implies that there is a good correlation between 24hr urine protein and spot urine protein creatinine ratio which is significant at p value <0.001 in 22 patients with mild preeclampsia.
- b) For n number of subjects with severe preeclampsia n=38.
 Degree of freedom=n-2=36.
 At 36 degrees of freedom table value =0.519 at pvalue<0.001, and observed value =0.895.

It implies that there is a good correlation between 24hrs urine protein and spot urine protein creatinine ratio which is significant at p value <0.001 in 38 patients with severe preeclampsia.



Graph 13

This graph shows the distribution of 24hr random urine protein and spot urine protein creatinine ratio in patients with severe preeclampsia. Considering 24hour urine protein as gold standard test 24 hour urine protein.

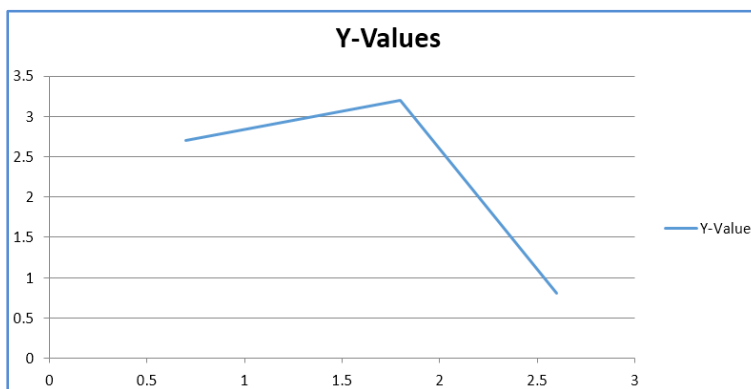
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Spot p/c ratio	+ve>300mg	_ve<300mg
+VE>.3	57 TP	1 FP
_ve<.3	0 FN	2 TN

Sensitivity of Spot urine P/C ratio-100% $(A/A+C)*100$.

Specificity of spot urine p/c ratio-66.67% $(D/B+D)*100$.

Positive predictive value of spot p/c ratio-98.27% $(A/A+B)*100$.



Graph 14

24hrs urine protein.

Spot urine protein creatinine ratio.

Severe preeclampsia.

	Mild pet	Severe pet	Total
No. of cases	22	38	60
Mean age in yrs	24	23	23.1
Mean pog in weeks	38	37.4	37.7
No of primi	13	29	42
No of multi	9	9	18
Mean Hb	9.06	95	9.34
platelets	2.02	1.91	1.95
Blood urea	21.5	23.46	22.93
Serum Creatinine	0.754	0.93	0.87
Serum Uric Acid	4.55	5.9	5.41
Elevated Left		8	8
Grade 1 Fundus- HTN		3	3
Mean Systolic Blood Pressure (mmHg)	140	161.84	155.7
Mean Diastolic Blood Pressure (mmHg)	90	113.42	104.67
Mean spot urine protein creatinine ratio	.845	2.65	1.99
Mean 24 hr urine protein	745.18	2167.7	1645.72
Correlation ratio	.801	.895	.96
P value	<.001	<.001	<.001
FTNVD	17	16	33
PTNVD	1	4	5

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CAESAREAN SECTION	4	18	22
NO of IUGR cases	5	15	20
Mean birth wt in kgs	2.55	2.272	2.37
Meconium liquor	3	15	18
NICU admission	4	24	28
LIVE	22	34	56
Still birth		1	1
dead		3	3

Table 11: Summary

No. of cases of IUGR	20	
Primi	14	
Multi	6	
Severe pet	15	
Mild pet	5	
Mean age	23.7yrs	
POG	37.75 wks	
Systolic BP	159mmHg	
Diastolic BP	109mmHg	
Blood urea	24.75mg/dl	
Serum creatinine	.945mg/dl	
Serum uric acid	5.86mg/dl	
Hb%	9.23g	
Platelet count	1.97 lacs	
Spot urine protein creatinine ratio	2.819	
24 hr urine protein	2287mg/24 hrs	
Correlation ratio	.95	P value <0.001
Birth weight	1.93	
Elevated LFT	5	
Grade 1 fundus	2	

Table 12: IUGR in preeclampsia

Number of patients with preeclampsia associated with IUGR n=20.

Degree of freedom = n-20 =18

At 18 degrees of freedom table value=0.665 with p value <0.001: observed value =0.95.

It implies that the correlation ratio between 24hr urine protein and spot urine protein ratio is highly significant at p value <0.001 in patients with preeclampsia associated with pre eclampsia.

ANALYSIS: An accurate and rapid detection and quantification of proteinuria are essential in the management of hypertensive disorders in pregnancy. This can help us know the severity of proteinuria much earlier and hence the severity of the disease process, which can alter the course of management. In the present study of 60 preeclamptic women, the mean age of the patients was 23.1 years and the mean gestational age was 37.7 weeks. 22 (37%) had mild preeclampsia and 38(63%) had severe preeclampsia, 3 patients (5%) had proteinuria <300mg, 45(75%)

ORIGINAL ARTICLE

had proteinuria between 300-2000mg and 12(20%) had proteinuria >2000mg based on gold standard test 24hour urine protein compared to spot p/c ratio, 2 pts (3%) had p/c ratio <0.3, 51pts (85%) had p/c ratio 0.3-3, and 7 pts (12%) with p/c ratio >3. The incidence of preeclampsia was higher in primigravidas 42(70%) than in multigravidas 18(30%), majority 42 (70%) of them were in the age group of 21-30 years. In patients with age <20 years 82% had severe preeclampsia. It was observed that, 40 patients (67%) were in the gestational age of 36-40 weeks. And severe preeclampsia was found to be the most common in this period of gestation 27 cases(68%). It was also observed that the earlier the onset of disease in pregnancy, the more severe it is. The overall correlation coefficient (r) between 24 hrs urine protein and spot protein creatinine ratio $r=0.906$ at p value <0.001 . Of the 60 subjects 22(37%) of them underwent Cesarean section, the commonest indication being severe preeclampsia and associated fetal distress. 5(8%) of subjects had a preterm delivery. Of the 60 subjects delivered at our hospital 33% have birth weight between 2-2.5 kgs, one baby was still born and 3 babies died in ICU in view of low apgar and preterm. The perinatal outcome in women with severe preeclampsia was poor with increased incidence of IUGR, LBW, preterm births, meconium stained liquor and requiring higher need for NICU admission. Of the 60 patients with preeclampsia, 7 patients developed eclampsia, 2 patients had abruption and 2 cases developed partial HELLP syndrome.

The study was limited to hospitalized non ambulatory patients. Since the protein excretion is affected by postural change, being higher in the standing than in supine position, the ambulatory status of the patients is important while interpreting the results. We found a good degree of correlation in our study, when the 24 hours urine protein and the random urine protein-creatinine ratios were correlated with $r=0.906$ and the p value being highly significant at <0.001 , when all the observations were considered.

The correlation was also found to be good at $r = 0.641$ and $p < 0.001$, for lesser degrees of proteinuria < 3 gms/24 hours and protein/ creatinine ratio also < 3. But when the correlation was computed for higher degrees of proteinuria i.e.; > 3gms/24 hrs, there was a fair correlation with $r=0.88$ and p value being <0.01 which is statistically significant but to a lesser degree than proteinuria <3 gms/24 hours. In a similar study conducted by Jaschevatzky et al in 1990, the Degree of correlation between the two variables at >2gms/ 24 hrs proteinuria was lower but still significant at $p < 0.05$.

Study	Correlation co-efficient R	P value
Ginsberg et al	.93	<.001
Neithardt et al 2000	.93	<.001
Robert et al	.94	<.001
Boler et al	.99	<.001
Sauden et al	.93	<.001
Young et al	.80	<.001
Jashevatsky et al 1990	.92	<.001
Shahbazian 2008	.84	<.001
Bansal bhavna 2009	.83	<.001
Present study	.906	<.001

Table 13: Comparison of present study with similar studies

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All of the previous studies demonstrate an excellent correlation between the 24 hrs urine protein and the protein/ creatinine ratio. The p values are also statistically very significant at <0.001 which is also seen in our study. We have found the use of this alternative test to 24 hours urine protein to be much more cost effective as shown with many studies previously. We have also found the 24 hours urine collection to be cumbersome and inconvenient for a pregnant woman. Since the present study included women only with a stable renal function, our study supports the use of the protein/creatinine ratio in women with normal to mildly impaired renal function (<1.6mg %). The mean serum creatinine value in our study group was 0.87mg/dl. But Robert et al in 1997 and Quadri et al in 1994 have proved in their studies that the protein/creatinine ratios are independent of renal function and reliable even in the presence of underlying renal disease and have advocated their use to monitor renal function in pregnancy.

In our study results were:

- The overall correlation coefficient (r) between 24 hrs urine protein and spot protein creatinine ratio $r = 0.906$ at p value <0.001.
 - a) When 24 hour urine protein values were <3gms, spot p/c ratio values were <3- as shown in the graph all the observations are clustered around this range which has a good correlation coefficient of $r = 0.641$ with p value <0.001.
 - b) when 24 hour urine protein values were >3gms, spot p/c ratio values were along the line but not clustered, the correlation coefficient $r = 0.88$ at p value <0.01, it implies that even at higher ranges of proteinuria though significance decreases, a fair correlation exists between 24 hour urine protein and spot p/c ratio.
- In the present study it was observed that with proteinuria <300 mg a negative correlation exists between 24 hour urine protein and spot p/c ratio. This observation can be explained by the fact, that, the number of patients in this range of proteinuria was less and also in the exclusion criteria those patients with dipstick <1+ (like traces and negative) is excluded from the study.

Hence care should be taken while interpreting the protein/ creatinine ratios at severe degrees of Proteinuria.

DISCUSSION: Pre eclampsia is a major cause of maternal mortality& morbidity, perinatal deaths, pre term birth and IUGR.^{1,2,3,4,5}

The main pathology in PIH is reduced concentration of angiogenic growth factors and increased placental debris in maternal circulation resulting in a (mainly hypertensive) maternal inflammatory response.¹

PET may be seen as a 2 stage Disorder: Stage 1 – poor placentation (early) and stage 2 – placental oxidative stress (late) leading to 1 fetal growth restriction 2 systemic release of placental factors - systemic inflammatory response - endothelial activation - pre eclampsia syndrome 4.

The optimal method of establishing either abnormal levels of urine protein or albumin remains to be defined. Dipstick qualitative determination depends upon urinary concentration and may give false positive and false negative results. For 24 hrs quantitative specimen the standard consensus is > 300mg.^{1,2,3,4,5}

ORIGINAL ARTICLE

Determination of threshold value of urinary protein and albumin, creatinine ratio may supplement the cumbersome 24 hrs quantification. Papanna and associates in 2008 concluded that random urine protein creatinine ratios <130-150 or from 0.13 to 0.15 indicate that the likelihood of proteinuria >300 g/day is low.

+Newly available test kits permit rapid measurement of urinary albumin creatinine ratio in an OPD setting (Kyle). In non-ambulatory hypertensive patients there is a strong correlation between random voided protein creatinine ratio and 24 hrs urine protein excretion.⁶

Placental soluble fms like Tyrosine kinase, an antagonist of VEGF and placental growth factor is up regulated in pre eclampsia. It is suggested that excess circulating SFLT 1 contributes to the pathogenesis of pre eclampsia.⁷

There is excellent correlation between CG formula using pre pregnancy weights and 24 hr creatinine clearance and between P.C and 24 hrs urinary protein. The P.C ratio can be used instead of cumbersome 24 hrs urine collection to assess protein excretion and creatinine clearance serially throughout pregnancy.⁸

One can use a single voided PC ratio in hospitalized pregnant patients to predict the 24 hr urine result.⁹

A random protein creatinine ratio provides an accurate and rapid quantitation of proteinuria in hypertensive pregnant women. This should improve clinical care especially when managing hypertensive pregnant women as outpatients.¹⁰

Since the level of urinary protein excretion has considerable clinical implications in the course of pregnancy and on the perinatal and maternal outcome, the early detection of even minor degrees of proteinuria is important. And Dipstick analysis as a screening for proteinuria lacks reliability with a high rate of false positives.^{1,2,3,4}

For years, 24 hour urine collection has been the standard for quantification of proteinuria in the management of women with pre eclampsia. However, this method requires good patient compliance and results in the delay in the diagnosis of >24 hours from the start of collection. Our contention was that the value of the protein/creatinine ratio in a single urine sample is potentially more accurate, because it avoids collection errors and may give more physiologically relevant information. Quantitating proteinuria in a random sample has been found to be far more cost effective and acceptable to the patient than a 24 hour urine collection. Since pre eclampsia is a progressive disease, repeated laboratory examinations to quantitate proteinuria are required. Protein/ creatinine ratio has been found to be a superior diagnostic tool compared to the routine urinalysis which would otherwise be used for daily quantification of Proteinuria. It is especially found to be useful in an outpatient setting to predict clinically significant Proteinuria and to monitor renal functions in such women with lesser degrees of proteinuria thus avoiding unnecessary hospital admissions. The present study indicates that this method for quantization of proteinuria, when properly interpreted, can provide valuable information, that for clinical purposes is a satisfactory substitute for the determination of protein excretion in a 24 hour collection^{1,4}

CONCLUSION: Pre-eclampsia is associated with complication if not diagnosed in time and manage properly. To prevent further complication better to get some important investigation

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which will give you clue for further deterioration of the disease. Urine for protein creatinine in ratio is one of the important investigations which will provide you information about progress of the disease if properly interpreted.

REFERENCES:

1. Sibai B., Dekkar G, Kupfermine M, Preeclampsia, Lancet.2005:365:785-799.
2. Walker Pre Eclampsia Lancet2000 356, 1260-5.
3. Steer J Philip, Weiner Carl, Gonik Bernard, High risk pregnancy management options. 4th edition.600.
4. Cunningham G, Macdonald P, Norman F Gant, Kenneth P Leveno-Williams Obstetrics 23RD edition. 710-730.
5. Arias Fernando – Practical guide to high risk pregnancy and delivery.3rd edition. 398-400.
6. Magali Robert, Farshad Sepandj, Robert M Liston, Kent C Dooley,-Random Protein Creatinine Ratio for the Quantitation of Proteinuria in Pregnancy||, Obstet Gynecol, 1997, vol. 90: 893-5.
7. Maynard SE, Min JY, Mercham J, et al., Excess placental soluble fms-like tyrosine kinase 1 (SFlt 1) may contribute to endothelial dysfunction, hypertension and Proteinuria in Preeclampsia, J Clin; 2003-111,649-58.
8. K. H. M. Quadri, J. Bemardini, BSN, A. Greenberg et al,-Assessment of Renal Function During Pregnancy Using Protein to Creatinine Ratio and Cockcroft-Gault formula||, Am J of Kidney Diseases, 1994, vol. 24, No.3 (September): 416-20.
9. Adrienne B Neithardt, Sharon L Dooley, Jayne Borensztajn, -Prediction of 24 hour protein excretion in pregnancy with a single voided urine protein to creatinine ratio||, Am J Obstet Gynecol, 2002,vol. 186: 883-886.
10. Patrick J Saudan, Mark A Brown, Tanya Farrell, Loretta Shaw, -Improved Methods of assessing proteinuria in hypertensive pregnancy||, Br J Obstet Gynaecol, 1997, vol. 104:1159-64.

AUTHORS:

1. R. Padmaja
2. M. L. Rajeshwari
3. Swetha

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Obstetrics & Gynecology, Andhra Medical College, Visakhapatnam.
2. Assistant Professor, Department of Bio-chemistry, Andhra Medical College, Visakhapatnam.
3. Senior Resident, Department of Obstetrics & Gynecology, Andhra Medical College, Visakhapatnam.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. R. Padmaja,
Door No. 15-9-4/17,
Plot No. 101,
Sea Scape Apartments, Krishna Nagar,
Maharanipeta, Vizag-530002.
E-mail: rajupadmaja1971@gmail.com

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