

ORIGINAL RESEARCH

Study and Comparison of Renal Function tests in Pre-eclampsia and Eclampsia with Normal Healthy Pregnant Women

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ABSTRACT

Background: Preeclampsia is a multisystem disorder, which occurs only in pregnant women during the second and third trimesters of pregnancy and is associated with raised blood pressure and proteinuria. It rarely presents before 20 weeks of gestation like in hydatidiform mole. Eclampsia is a syndrome with one or more episodes of convulsions in association with preeclampsia. In India, the national incidence of hypertensive disorders is 15.2%, with incidence in nulliparous women being four times greater than in multipara. With severe renal involvement, glomerular filtration may be impaired and the plasma creatinine concentration may begin to rise. Elevated uric acid is another component of the preeclampsia. Although hyperuricemia does correlate with maternal morbidity, there is an even stronger association of uric acid with the risk for small birth weight infants and with overall foetal mortality. The hyperuricemia of preeclampsia has been variably suggested to be associated with lactic acidosis, altered renal functions or oxidative stress. **AIM:** To Study and compare renal function tests in Pre-eclampsia and Eclampsia with normal healthy pregnant women and assess the antepartum severity in both the diseases.

Materials and Methods: Study was conducted on 70 pregnant women admitted with pre-eclampsia and eclampsia and 35 normal pregnancy patients in between 19-26 yrs of age in third trimester of pregnancy.

Results: There is a increase in Diastolic blood pressure in mild pre-eclampsia and significant increase in severe pre-eclampsia and eclampsia patients when compared to controls. There is a increase in serum uric acid in mild pre-eclampsia and significant increase in all parameters in severe pre-eclampsia and eclampsia patients when compared to control.

Conclusion: There is a derangement of parameters of RFT in severe preeclampsia and eclampsia. But there was no significant elevation in mild pre-eclampsia. Persistent Renal parameter that increased was Uric acid. These can be taken as a predictor of the disease.

Keywords: Diabetes Pre-eclampsia, Eclampsia, Urea, Creatinine, Uric acid.

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INTRODUCTION

Preeclampsia is a multisystem disorder, which occurs only in pregnant women during the second and third trimesters of pregnancy and is associated with raised blood pressure and proteinuria. It rarely presents before 20 weeks of gestation like in hydatidiform mole.^[1]

Eclampsia is a syndrome with one or more episodes of convulsions in association with preeclampsia. In India, the national incidence of hypertensive disorders is 15.2%, with incidence in nulliparous women being four times greater than in multipara.^[2]

In normal pregnancy there is decreased blood pressure response to pressor substances but in preeclampsia there is marked response to vasopressin, norepinephrine and angiotensin. This response of arterial system leads to generalized vasoconstriction and hypertension in preeclampsia. Generalized vasoconstriction is responsible for decreased GFR and renal plasma flow. This causes alteration in various biochemical parameters. These alterations secondarily lead to many pathophysiological changes which adversely affect maternal and fetal wellbeing.

Preeclampsia is multi systemic disorder and multi organ dysfunction is due to increased blood pressure.^[3] Liver function abnormalities and renal function abnormalities are the important causes.^[4] Preeclampsia is associated with substantial risks for the fetus, which include Intrauterine growth retardation, death and prematurity with attendant Complications. Where as mother is at risk of seizures (eclampsia), renal failure, pulmonary odema, stroke and death. Even after considerable research, the cause for preeclampsia remains unclear and there is no useful screening tests in early diagnosis of preeclampsia.^[5]

Complications are likely to occur during pregnancy, during labour, and in puerperium if the patient is left uncared. With severe renal involvement, glomerular filtration may be impaired and the plasma creatinine concentration may begin to rise.

Elevated uric acid is another component of the preeclampsia. Although hyperuricemia does correlate with maternal morbidity, there is an even stronger association of uric acid with the risk for small birth weight infants and with overall foetal mortality.^[6] The hyperuricemia of preeclampsia has been variably suggested to be associated with lactic acidosis, altered renal functions or oxidative stress.

So, the objective of this study was to compare renal function tests in preeclampsia and eclampsia with normal pregnancy.^[7]

MATERIALS & METHODS

It is a prospective study, carried out on 70 pregnant women admitted with pre-eclampsia and eclampsia and 35 normal pregnancy patients in between 19-26 yrs of age in third trimester of pregnancy at modern govt. maternity hospital, petlaburz, Hyderabad, a tertiary care referral unit. Detailed history and examination was carried out. Investigations like complete hemogram, renal function tests, coagulation profile, fundus and 24 hours urine for protein were done. Obstetric management was done as per existing protocol in the department, magnesium sulphate was the drug of choice for controlling convulsions, and blood pressure was controlled either by oral nifedipine or methyl dopa.

This study was carried out in the department of obstetrics and gynaecology in association with department of biochemistry at modern govt. maternity hospital, petlaburz, Hyderabad.

Preeclampsia: classified as mild & severe preeclampsia. Mild preeclampsia is diagnosed by high blood pressure & high levels of protein in urine. Severe preeclampsia is diagnosed by symptoms of mild preeclampsia plus signs of kidney or liver damage.

Eclampsia: A life threatening condition during pregnancy or shortly after giving birth characterised by the development of seizures.

Exclusion Criteria:

Pregnant women with other disorders like chronic liver disease, renal disease and medications causing liver damage are excluded. Those patients with pre-existing hypertension, diabetes mellitus, gestational hypertension, active urinary tract infection and refusal to cooperate are excluded.

Collection of blood sample for analysis:

A random venous blood sample(5ml) was drawn from the patients in to a sterile disposable syringe which was transferred into centrifuge tubes and allowed to clot for 30 minutes. The sample was centrifuged at 3000 rotations per minute for 10 minutes and serum was separated and collected from the centrifuge tubes and stored at -20c until analysed.

The following parameters were estimated in all patients

1. Blood urea
2. Serum Creatinine
3. Serum Uric acid

Methods:**Renal Function Tests**

Blood Urea:(GLDH Kinetic method) normal-14-40mg/dl

Serum Creatinine:JAFFES method. Normal- 0.6-1.2mg/dl

Serum Uric Acid:URICASE/PAPmethod),^[8] normal -3.5 -6.0mg/dl

URINE PROTEIN by dip stick.

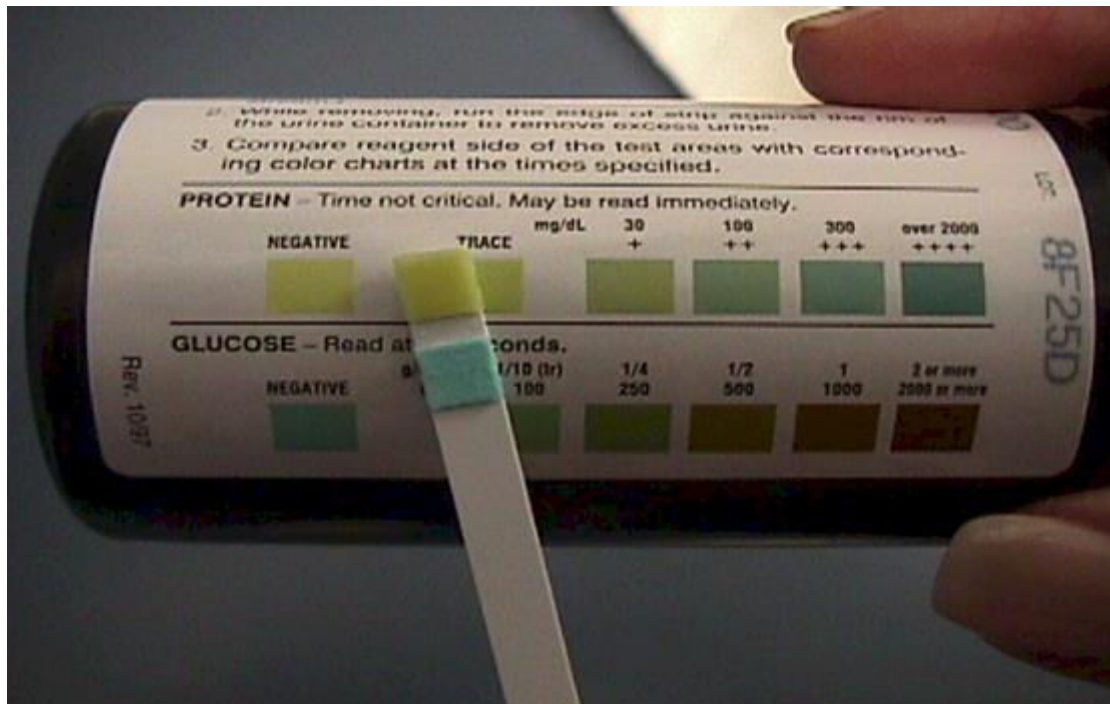


Figure 1: ?

RESULTS

Comparisons of Diastolic blood pressure between normal and mild pre eclampsia patients

Table 1: Comparisons of Diastolic blood pressure between normal and mild pre-eclampsia patients

S. No	Investigation		Control	Mild pre-eclampsia Group-1
01	Diastolic Blood Pressure	Mean	75	94.7
		SD	6.30	11.5
		t-Test	11.5	
		p-Value	0.0001	

The above table shows the comparative data of diastolic blood pressure (mm Hg) in control and cases of mild preeclampsia. The mean and S.D of normal pregnancy and mild preeclampsia is 75 ± 0.78 , and 94.7 ± 11.18 and p value is 0.0001 which is highly significant. (P-value <0.005 is significant)

Table 2: Comparisons of different parameters between normal and severe preeclampsia/eclampsia patients

S. No	Parameters		Control	Severe pre-eclampsia/eclampsia Group-2
01	Diastolic Blood Pressure	Mean	74	104.5
		SD	6.05	6.1
		t-Test	20.7	
		p-Value	0.0001	

The above table shows the comparative data in control and severe preeclampsia and eclampsia cases. The means and S.D of diastolic blood pressure (mm Hg) in controls, and group-2 are 75 ± 0.762 and 104.5 ± 6.1 respectively and p value is 0.0001 which is highly significant. (P-value <0.005 is significant).

Table 3: Comparisons Of Renal Parameters Between Normal And Mild Pre Eclampsia Patients

S. No	Investigation		Control	Mild Pre-Eclampsia Group-1
01	Blood Urea	MEAN	16.54	17.31
		SD	1.65	1.72
		T-test	6.2	
		P-value	0.54	
2	Serum Creatinine	MEAN	0.62	0.64
		SD	0.06	0.065
		T-test	0.51	
		P-value	0.82	
3	Serum Uric Acid	MEAN	3.63	4.6
		SD	0.19	0.4
		T-test	2.5	
		P-value	0.0001	

The above table shows the comparative data of renal parameters in control and cases with mild preeclampsia. The means and S.D of blood urea, serum creatinine and uric acid in control and group-1 are 16.54 ± 1.65 , 0.62 ± 0.06 , 3.63 ± 0.19 , and 21.2 ± 3.09 , 0.64 ± 0.065 , 4.6 ± 0.4 , respectively .p value is > 0.05 for both urea and creatinine which is not significant but p value for uric acid is 0.0001 which is significant (0.001).

Table 4: Comparisons of Renal Parameters Between Normal And Severe Preeclampsia/Eclampsia Patients

S. No	Parameters		Control	Severe pre-eclampsia/eclampsia Group-2
01	Blood Urea	MEAN	16.23	23.25
		SD	1.65	3.18
		T-test	8.9	
		P-value	0.001	
2	Serum Creatinine	MEAN	0.62	1.09
		SD	0.06	0.23
		T-test	11.5	
		P-value	0.0001	
3	Serum Uric Acid	MEAN	3.63	7.04
		SD	0.19	1.57
		T-test	12.7	
		P-value	0.0001	

The above table shows the comparative data of renal parameters in control and Group- 2. Means and S.D of blood urea, serum creatinine, and uric acid in controls and Group-2 are 16.54 ± 1.6 , 0.62 ± 0.06 , 3.6 ± 0.19 , and 23 ± 3.613 ., 1.09 ± 0.23 , 7.04 ± 1.57 .p value is <0.0001 which is highly significant.

DISCUSSION

Hypertensive disorders complicating pregnancies are common and form one of the deadly triad along with haemorrhage and infection that contribute greatly to maternal morbidity and mortality.

In this study 80%(56) are primis in preeclampsia and eclampsia cases Diastolic BP is significantly elevated in preeclampsia and eclampsia patients.

In the present study non protein nitrogenous substance like urea,creatinine, and uric acid are studied in preeclampsia and eclampsia and normal pregnancy

The results of present studies are discussed under 3 groups.

1. Control group(normal pregnancy)
2. Mild preeclampsia (Group-1)
3. Severe preeclampsia and eclampsia (Group-2)

Control Group

A total number of 35 normal pregnant women were studied. The age group of these subjects ranged from 19-26yrs.

All these subjects are normotensive and healthy pregnant women. This is in line with the study by Ylostolo (1970), Panerietal(2011)and renal function tests are in the lower limit of non-pregnancy reference range

GROUP-1(Mild preeclampsia)

A total number of 35 cases have been studied in this group.

Renal function tests like urea and creatinine are not significantly elevated. But serum uric acid is increased significantly p(0.0001)

GROUP 2(Severe preeclampsia and eclampsia)

Serum creatinine and urea is significantly elevated $P<0.001$ in these cases . It is line with Jumaan et al.^[9]

Some investigators found that the activity of mono amino oxidase (MAO) is lower and serotonin is higher in the placental tissue from women with preeclampsia as compared with placental tissue from normal pregnant women.^[10,11] These factors lead to a reduction in renal perfusion in a women with PIH, by an average of 20% and reduction in GFR by an average of 32% in comparison with normal pregnant women near term.^[12] So, as a result of reduced GFR, serum creatinine levels and blood urea rise above normal pregnancy levels.^[13]

Hussein et al and salakoet al who found that no significant difference in the mean value of creatinine in preeclamptic and normotensive pregnant women.^[14,15]

In my study there is significantly raised uric acid levels. In several studies it was found that the extent of the elevation in SUA level in pre-eclamptics was an indicator for the degree of severity of this disorder. Elevated SUA levels have also been interpreted to act as an important cofactor involved in the pathogenesis and manifestation of pre-eclamptic disorder.^[7] It is in line with study of Jumaan et al.^[9] Suchanda and Kiyomi et al also had same results Present study suggest that serum Uric acid appears to be of immense value in understanding the pathogenesis and also appears to be an important contributing factor of pre eclampsia.^[16,17]

CONCLUSION

Renal involvement is common in preeclampsia and eclampsia.

There is a derangement of parameters of RFT in severe preeclampsia and eclampsia. But there was no significant elevation in mild pre-eclampsia

The average diastolic BP when significance changes occurred was around 105mmHg

Persistent renal parameter that increased was serum uric acid.

Though it is ideal to perform complete tests, it may be advised to perform uric acid only in limited resource settings to make it cost effective.

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