

Evaluation Of The Changes Of Serum Biochemical Parameters Of Kidney In Preeclampsia and Normal Pregnancy of Primigravidas Attending A Tertiary Care Hospital In Assam

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Abstract: The study was undertaken to evaluate the changes in some of the renal parameters - serum creatinine and blood urea in preeclamptic primigravidas and normal primigravidas. This hospital based study consisted of two groups - case group (n=60) with women having preeclampsia and control group (n=60) with normal pregnant women. The subjects in the two groups were of more than 20 weeks of gestation and age group 20-35 years with singleton pregnancy. Serum creatinine and blood urea was estimated in fully automated analyser Vitros 250 using Vitros reagent packs. Statistical analysis was done using student t test and p value calculated. A significant increase in serum creatinine and blood urea level was observed in the preeclampsia (case) group compared to the normal pregnant (control) group. Therefore assessment of serum creatinine and blood urea helps in monitoring the function of the kidney in preeclampsia and in preventing maternal and fetal complications during the preeclampsia and also in preventing further maternal complications due to the disease in future.

Keywords: Blood urea, Glomerular capillary endotheliosis, Preeclampsia, Serum creatinine.

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I. Introduction

Pregnancy, although a normal physiological phenomenon in women, is associated with changes in hormonal, haematological, cardiovascular and the renal systems. The changes in the kidney is associated with the increase in the renal blood flow leading to increase glomerular filtration rate. Therefore, there is increase in the renal clearance of creatinine and urea. The changes in renal function along with changes in maternal protein and nitrogen metabolism occurs during pregnancy. All the above facts lead to lowering of serum creatinine and blood urea level.[1,2,3,4,5]

However, with the onset of preeclampsia the whole scenario changes. Preeclampsia, a pregnancy specific disorder is defined as the onset of hypertension ($\geq 140/90$ mmHg noted on two different occasions 6 hours apart) after 20 weeks of gestation with proteinuria (≥ 300 mg/24 hours or $\geq +1$ / random sample dipstick test) which persist upto 12 weeks after delivery. It involves multisystem, causing the risk of maternal and fetal mortality and morbidity. It is more prevalent in developing countries than developed countries. The incidence of preeclampsia varies in the different geographic area depending on the different ethnicity, social characteristics and associated risk factors. It occurs more in primigravidas compared to multigravida.[6,7,8]

Although, the pathophysiology the disease is not known, studies[8,9] suggest that genetic abnormalities, immunological intolerance between foeto-placental and maternal tissues and oxidative stress are the cause of the disease. Some suggest that it occurs due to abnormal placentation which results in hypo perfusion of the uterus and placenta. This tissue ischaemia and oxidative stress causes release of some antiangiogenic factors in the maternal circulation resulting in generalised maternal endothelial cell dysfunction affecting most of the maternal organs — liver, brain and the kidneys.[6,8]

In kidney the characteristic changes that occur is glomerular capillary endotheliosis leading to decrease in renal blood flow and glomerular filtration rate. These subtle changes that occurs in the renal system may lead to premature delivery of the fetus and may cause chronic hypertension and even renal failure in the mother in future.[6,10] Therefore, study of the renal parameters in preeclampsia is essential. The association of increase in serum uric acid level in preeclampsia and its impact in maternal and fetal health has been studied by several researchers[11,12,13,14,15]. With these background knowledge, the present study was undertaken to evaluate the changes in serum creatinine and blood urea in preeclamptic primigravida and normal primigravida, attending the Obstetrics and Gynaecology Department of the Tezpur Medical College Hospital, Tezpur, Assam.

II. Materials and Methods

The study was conducted in the Biochemistry wing of the Central Clinical Laboratory of Tezpur Medical College, Tezpur, Assam. The subjects for the study were selected from the Department of Obstetrics and Gynaecology, Tezpur Medical College and Hospital after taking proper history, clinical examination and screening for 24 hours protein in urine.

The subjects were divided into two groups – Case group and control group. Case group included 60(sixty) diagnosed and confirmed cases of primigravida with preeclampsia of 20-35 years of age. Control group included 60(sixty) age matched healthy normotensive primigravida with more than 20 weeks of gestation.

Inclusion criteria for the study groups were primigravida with singleton pregnancy of more than 20 weeks of gestation with blood pressure 140/90 mm Hg, noted for the first time during pregnancy in 2(two) occasions atleast 6(six) hours apart with proteinuria, at least 300mg/24 hours in case group and healthy normotensive primigravida with singleton pregnancy of more than 20 weeks of gestation in the control group. The age group considered was 20-35 years of age.

The exclusion criteria for the study included pregnant women with Multiple pregnancy, Gestational Diabetes Mellitus, history of Diabetes Mellitus, overweight, obese, history of Renal disease, Liver disease and Cardiac disease, Urinary tract infection, Chronic Hypertension and any other major illness. Pregnancy with history of alcoholism, smoking and drug abuse were also excluded.

Under all aseptic and antiseptic care, 5 ml of venous blood were collected from the anticubital vein from the subjects under study in a vacutainer after taking proper informed consent. Blood samples were allowed to clot. The samples were then centrifuged at 3000rpm for 10 minutes and clear supernatant serum obtained. The serum samples thus obtained were utilised for the estimation of serum creatinine and blood urea. These investigations were done in fully automated analyser of Vitros 250 using Vitros reagent pack.

Statistical analysis were done by finding the mean± standard deviation(SD) for each parameter under study for both the groups and the values of the parameters of the cases were compared with that of the control by performing Student's t test and the level of significance were determined by P value. P value of < 0.05 was considered significant.

III. Results

The finding of the different parameters under study for both the groups –Case and control and the statistical analysis with their P value are depicted in the tabular form below (**TABLE I**):

TABLE I :The Mean±SD Of The Parameters Under Study In Case Group And Control Group Along With p Value.

| Parameters under study | Case group Mean ± SD | Control group Mean ±SD | P value |
|--------------------------|-------------------------|---------------------------|----------|
| Serum creatinine (mg/dl) | 0.95±0.37 | 0.51±1.15 | P<0.0001 |
| Blood urea(mg/dl) | 32.93±22.48 | 10.89±2.75 | P<0.0001 |

IV. Discussion

In the study, serum creatinine level in the case group was 0.95±0.37 mg/dl compared to 0.51±1.15 mg/dl in the control group with the p value < 0.0001 which was highly significant. The Blood urea level in the case group was 32.93±22.48 mg/dl compared to 10.89±2.75 mg/dl in the control group with p value <0.0001 which was also significant. Therefore, there was significant increase in serum creatinine and blood urea in preeclamptic primigravidas with singleton pregnancy compared to normotensive primigravidas with singleton pregnancy. Similar type of findings were seen in studies conducted by other researchers in different parts of India and abroad.

Vyankaranam et al, also found an elevated level of serum creatinine (0.94±0.26 mg/dl) in preeclampsia compared to (0.66±0.19 mg/dl) in pregnancy induced hypertension and(0.63±0.13 mg/dl) in normal pregnancy with p value <0.001.[15]

Padma et al in their study found an increase in serum creatinine level in preeclampsia (0.95±0.2 mg/dl) compared to pregnancy induced hypertension group(0.67±0.14 mg/dl) and healthy pregnant women(0.67±0.1 mg/dl) with p value <0.001.[16]

Hazari et al found increase in serum creatinine level in severe preeclampsia (1.3±0.19 mg/dl) and (0.75±0.23 mg/dl) in mild preeclampsia compared to normal pregnancy (0.62±0.14 mg/dl) with a significant p value <0.05. The blood urea level in severe preeclampsia was 24.85±4.30 mg/dl and in mild preeclampsia 19.22±2.04 mg/dl compared to normal pregnancy 18.65±4.31 mg/dl with p value <0.05 which is statistically significant.[17]

Babu et al also found a significant increase in serum creatinine level in preeclamptic test group(1.94±0.32 mg/dl) compared to normal pregnant women (0.59±0.10 mg/dl) with p value <0.01. Blood urea level is also

significantly high in preeclamptic test group (23.56± 4.42 mg/dl) compared to normal pregnancy (12.8±1.9 mg/dl) with p value <0.01. [18]

Hidajet et al found an increase in blood urea level in preeclamptic group (4.6±1.7mmol/l) compared to normal pregnant group(2.46±0.8mmol/l) with statistically significant pvalue<0.0001. Increase in serum creatinine level in preeclampticgroup(64.0±22.0µmol/l) compared to normal pregnant control group(53.0±10.0µmol/l) with p value 0.11. [19]

Noura Al-Jameil et al also found an increase in blood urea nitrogen level in preeclamptic group (7.41±0.66 mmol/l) compared to high risk group(3.91±1.11 mmol/l) and normal pregnant group(2.06±0.78mmol/l). Increase in serum creatinine level in preeclampticgroup(65.83±18.50µmol/l) compared to high risk group(45.21±9.57 µmol/l) and normal pregnant control group(42.64±9.58µmol/l) with a statistically significant p value <0.001. [20]

Various studies suggest that hypo perfusion leads to decrease in glomerular filtration rate in preeclampsia coupled with abnormal renal tubular function, results in increase in serum creatinine and blood urea level. The increase in blood urea level is also due to microangiopathic haemolysis that occurs due to maternal endothelial dysfunction leading to increase synthesis of urea in the body . [20,19,10]

V. Conclusion

In the present study, a significant increase in serum creatinine and Blood urea level was seen in preeclamptic singleton primigravida cases compared to that of normal singleton primigravidas. Therefore assessment of renal parameters — serum creatinine and blood urea in preeclampsia is very essential for preventing maternal and foetal mortality and morbidity. And a close monitoring of these parameters will help in preventing future complications in these patients.

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