

# DETERMINATION OF SERUM CREATININE FOR PREDICTION OF PRE ECLAMPSIA

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## ABSTRACT :

**Objective:** Objective of this study is the determination of serum creatinine in gestational hypertension specifically pre-eclampsia and compare it with normal pregnant women of same gestational age, and to assess its role in preeclampsia.

**Study design:** Cross sectional analytical.

**Methodology:** This cross sectional study involved 100 pre-eclamptic pregnant women and 100 normotensive pregnant women of the same gestational age and parity for determination of serum creatinine, from the period of June 2015 to December 2015, involving the outpatients and admitted patients in Gynae/obs department of Lady Reading hospital and Hayatabad Medical Complex Peshawar, Khyber pukhtunkhwa.

**Results:** Mean and standard deviation for serum creatinine, systolic and diastolic blood pressure, were highly significant ( $p < 0.000$ ) in pre-eclampsia women as compare to control group. Mean and standard value for serum creatinine  $0.72 \pm 0.20$  in patients and  $0.62 \pm 0.10$  mg/dl in control group, were highly significant ( $p < 0.000$ ).

**Conclusion:** Serum creatinine shows significant correlation with systolic and diastolic blood pressure and may be helpful for early diagnosis and management of pre-eclampsia in order to prevent fetal and maternal complications due to pre-eclampsia (PE) and eclampsia

**Key Words:** Preeclampsia, normotensive, Serum creatinine, Eclampsia

## INTRODUCTION

Hypertension in pregnancy complicates 15-20% of pregnancies worldwide.<sup>1</sup> This is the most prevalent medical complication of pregnancy.<sup>2</sup> About 70% of this disorder is gestational hypertension, also called pregnancy-induced hypertension.<sup>3</sup> The most common in this group is Preeclampsia, which is defined as the rise of blood pressure (BP;  $\geq 140/90$  mmHg) measured on two different occasions about 4 hrs apart and appearance of protein in urine ( $\geq 0.3$  g/24 hr) after 20 weeks of gestation in pregnant women who were previously normotensive.<sup>4</sup>

Preeclampsia is universally one of the major cause of fetal and maternal mortality and morbidity.<sup>5</sup> If early intervention is not done preeclampsia leads to the complications like; eclampsia, HELLP syndrome, pulmonary edema, abruption placentae, postpartum circulatory collapse, acute renal failure, hepatic rupture, cerebral haemorrhage and visual disturbances including death. These conditions are also a major cause of neonatal morbidity and mortality.<sup>6</sup> In developing countries the incidence of preeclampsia is about 4–18% , and 4- 16% of all maternal mortality in developing countries

including Pakistan is due to preeclampsia.<sup>7</sup>

The etiology of preeclampsia is still uncertain, according to different theories the most probable cause is abnormal implantation of placenta and abnormal trophoblastic invasion.<sup>8-9</sup>

This results in reduced utero-placental perfusion, which leads to focal ischemia, hypoxia, detachment of hypoxemic trophoblast cells and abnormal expression of various placental biological molecules particularly the cytokines are thought to lead to widespread activation/dysfunction of the maternal vascular endothelium.<sup>10</sup> The renal system is also affected due to exposure to high level of angiotensin-2 without the normal physiological protective effects of reduced response to Angiotensin-2 which occur in normal pregnancy.<sup>11</sup> This result in elevation of blood pressure and a decreased in GFR.<sup>12</sup> Hypertension, proteinuria and increase in serum creatinine level in blood and decrease in urinary clearance may be present for days or weeks before the woman has any subjective complaints.<sup>13</sup>

The aim of this study was to measure and compare the level of S. Creatinine in preeclamptic and normotensive pregnant women and to determine its relation with severity of preeclampsia.

## MATERIAL AND METHODS

This study was carried out to determine the S.creatinine level in preeclamptic pregnant women during the time period of June 2015-December 2015,

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In the study 100 preeclamptic pregnant women and 100 normal pregnant women of the same gestational age and parity were selected. Gestational age was measured by last menstrual period and 1st trimester ultrasound.<sup>14</sup> Women having twin pregnancies, molar pregnancy, diabetes mellitus, chronic hypertension, renal disease, or any other infectious or inflammatory disease or on medication for the said diseases were excluded. The diagnosis of preeclampsia was done by women developing hypertension and proteinuria for the 1<sup>st</sup> time after 20weeks of gestation. Blood pressure was taken by mercury sphygmomanometer twice after interval of rest of about 15 min.<sup>15</sup>

After consent 5mL of venous blood was taken under aseptic techniques in sterile tube, followed by centrifugation for the separation of serum. Serum samples were stored at -4°C for biochemical analysis. S.Creatinine level was determined by Jaffe colorimetric-kinetic method.

The data was analyzed by using SPSS 16. The Mean and Standard Deviations were calculated for continuous data. Age and parity was presented in term of frequency and percentages. Student t-test was applied for the determination of difference between the groups for continuous biochemical parameters. Correlations were performed by using Pearson's correlation, where statistical significant was accepted at  $P < 0.05$ .

## RESULTS

In this study 100 preeclamptic pregnant women and 100 normal pregnant women of the same gestational age and parity were selected

Table 1 shows the mean age, weight, parity and mean gestational age of Pre-eclamptic and control individuals. Age, weight, parity and gestational age of both Groups were insignificant at  $P > 0.05$ .

In this study different age group were selected in both hypertensive pregnant and normal pregnant women. Age was divided into three sub groups. Group 1 includes 18-24 years, which is 43%, group 2 includes 25-34 years which is 67% and group 3 includes 34-40 years which is 11% respectively. High incidence of PE was observed between 25-34 years of age group.

Table 2 indicates the level of S.Creatinine and systolic and diastolic blood pressure of pre-eclamptic and control groups. The Serum Creatinine values of Group I (Pre-eclamptic women) were significantly higher at  $P < 0.001$  than the control subjects. The mean value of Seum Creatinine in Group I was  $0.72 \pm 0.20$  mg/dL as compared to  $0.62 \pm 0.10$  mg/dL in Group II(control subjects). Similarly the systolic and diastolic blood pressure of Group I was  $153.59 \pm 12.42$ mm Hg,  $101.65$

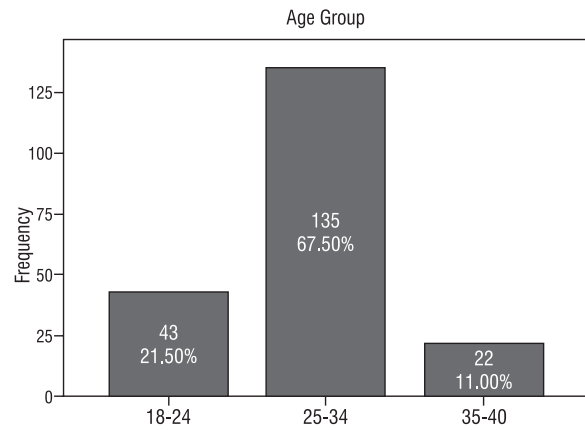


Fig 1: Distribution of overall subjects on the basis of age groups

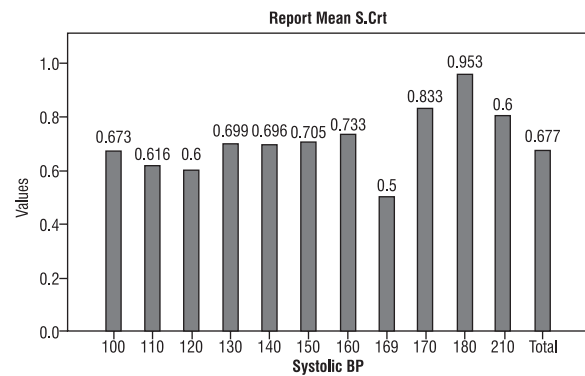


Fig 2: Shows relation of S.Creatinine and systolic Blood pressure

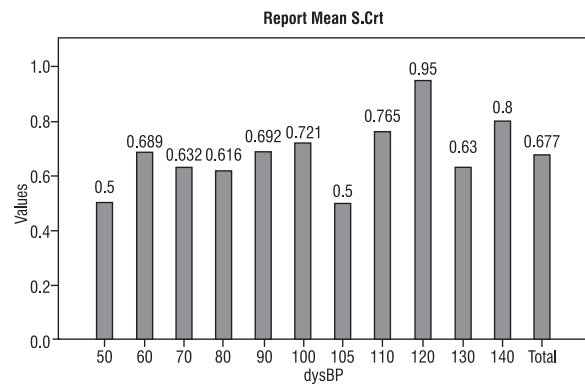


Fig 3: Shows relation of S.Creatinine and Diastolic Blood pressure  $\pm 9.72$  mm Hg as compared to  $114.90 \pm 8.70$  mm Hg,  $74.80 \pm 7.03$  mm Hg in control group.

Figure 2 and figure 3 shows the significant correlation between S.Creatinine and systolic and diastolic blood pressure respectively. As the blood pressure

**Table 1: Mean age and mean gestational age, weight and parity in PE and Control Subjects**

Variables	Patients(n=100)	Controls(n=100)	P-Value
Age (Years)	28.05±4.74	27.18±4.67	0.193
Weight (Kg)	69.32 ± 4.47	68.71± 4.70	0.348
Gravidity	2.52±1.21	2.46±1.18	0.723
Gestational Age (weeks)	33.34±5.26	33.36±5.31	0.979

**Table 2: S.Creatinine levels of control and hypertensive pregnant women**

Parameters	Patients	Controls	P- value
Serum.Creatinine mg/dL	.72±0.20	.62±0.10	.000
Systolic.BP (mm Hg)	153.59±12.42	114.90±8.70	.000
Diastolic BP (mm Hg)	101.65±9.72	74.80±7.03	.000

increases the level of S.Creatinine also increases, which shows relation of S.Creatinine with severity for PE.

## DISCUSSION

Hypertension in pregnancy complicates 15-20% of pregnancies worldwide.<sup>1</sup> preeclampsia complicates 4–18% of pregnancies in developing countries and, 4- 16% of all maternal mortality in developing countries including Pakistan is due to preeclampsia.<sup>7</sup>

The main causes of mortality and morbidity due to PE are, lack of education and access to prenatal and antenatal care, under-equipped hospitals in low resource areas, non availability of trained health professional and diagnostic tools. Because of all the above causes there is delayed medical intervention to reduce the risk of HTN, PE and Eclampsia.<sup>6</sup> The present study was designed to evaluate the cheapest and easily available test for early detection of pre eclampsia, to reduce maternal and fetal mortality and morbidity.

Yadav BS et al<sup>16</sup>, done a case control study in 2018 in Indian population. He selected 79 pre-eclampsia (cases) and 79 (controls) randomly, and matched them with their gestational age. His data showed the mean value of serum creatinine among pre-eclamptic group was high (1.21±0.47mg/dl) and was observed in 19.0% cases, while none were there in control group. The mean value of Creatinine showing significantly high S. Creatinine in pre-eclampsia, as compare to the control group ( p<0.000). Our findings also show serum creatinine level 0.72±0.20 mg/dL ( p<0.000) in patients and 0.62±0.10 mg/dL ( p<0.000) in control group, which is highly significant and thus in agreement with above cited study.

Shaheen A et al,<sup>17</sup> studied different parameters in pregnant women in three tertiary care hospitals of Peshawar, khyber pukhtunkawa, Pakistan. She selected 86 preeclamptic patients and 74 normal pregnant women. Her data showed positive correlation of serum visfatin,

urinary albumin, serum creatinine and blood urea with systolic and diastolic blood pressure with p<0.000 as compare to control group. The present data also show positive correlation with systolic and diastolic blood pressure.

Mohammad Sayyed Bakheet, et al,<sup>18</sup> done study in Egypt population and also found that S.Creatinine and other inflammatory cytokines were raised in pre-eclamptic pregnant women.

Magna and Sitikantha,<sup>19</sup> study showed insignificant rise in s.creatinine in preclamptic patients. Salako BL et al,<sup>20</sup> study also showed insignificant increase in S.Creatinine in preeclamptic women.

## CONCLUSION

Based on all the available studies as well as the present study, it is concluded that serum Creatinine level is elevated in hypertensive pregnant women. Therefore it is a valuable and independent marker for early diagnosis of PE and eclampsia. However in the view of some studies showing no significant correlation, there is need of further study on large sample size to establish facts so that this parameter can be used in early diagnosis of pre- eclampsia to prevent maternal and neonatal morbidity and mortality.

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