

## Evaluation of Serum Cystatin C compared with Creatinine: A study in patients with Pre-eclampsia

Salma Malik\*<sup>1</sup> and Omer Fadol Edris<sup>2</sup>

<sup>1</sup>Faculty of Medical Laboratory Science, Department of Clinical Chemistry University of Alneelain, Khartoum, Sudan

<sup>2</sup>Faculty of Science and Technology, Department of Biochemistry and Molecular Biology, University of Alneelain, Khartoum, Sudan.

### Corresponding author\*

Dr. Salma Malik

Faculty of Medical Laboratory Science,

Department of Clinical Chemistry University of Alneelain, Khartoum, Sudan.

E-mail: [salmamordas@gmail.com](mailto:salmamordas@gmail.com)

### Abstract

This is cross sectional study aim to evaluate of serum Cystatin C and Creatinine level among pre-eclampsia patients. Hundred subjects were evaluate in this study, 50 pre-eclampsia patients as cases and 50 healthy apparently as control groups. Serum Cystatin C and Creatinine were measuring using MISP-i2, Mindray respectively. In assessment of renal function and compare with creatin in women which diagnostic pre-eclampsia. Result showed there was significant increase in mean concentration of Cystatin C in case versus control groups with P-value 0.000, insignificant different in Creatinine level when compare case group with control group with P-value 0.706. The study conclude that serum Cystatin C is higher in pre-eclampsia patients while Creatinine show insignificant different as serum Cystatin C as marker for glomerular filtration, may be useful as marker for renal disease in pre-eclampsia.

**Keywords:** Cystatin C, Creatinine, pre-eclampsia.

### 1. Introduction

Worldwide the prevalence of preeclampsia (PE) ranges from 3 to 8% of pregnancies. 8.5 million Cases are reported yearly.[1] Biochemical markers in general and first trimester PE biochemical markers specifically. The main categories described are angiogenic/anti-angiogenic factors, placental proteins, free fetal hemoglobin (HbF), kidney markers, ultrasound and maternal risk factors. The specific biochemical markers discussed are: PAPP-A, s-Flt- placental growth factor (PGF), s-Endoglin, Placental Protein (PP13), cystatin-C, HbF, and  $\alpha$ -microglobulin (A1M). Pregnancy-associated plasma protein A (PAPP-A) and HbF both show potential as predictive biochemical markers in the first trimester with 70% sensitivity at 95% specificity. However, PAPP-A is not PE-specific and needs to be combined with Doppler ultrasound to obtain the same sensitivity as HbF/A1M. Soluble Flt -1 and PlGF are promising biochemical markers that together show high sensitivity from the mid-second trimester. PlGF is somewhat useful from the end of the first trimester. [1]

Biomarker A biological indicator whose presence, absence or abnormal concentration reflects the severity or presence of a disease.S.No. Biochemical Marker Plasma Concentration Manifest Trimester 1, Trimester 2, Preeclampsia 1. sflt- 1 (Soluble fms- like -- high Early increase tyrosine kinase) 2. Soluble Endoglin (sEng) -- high early increase 3. Placental Growth Factor low low further decrease (PlGF). Urinary podocyte (podocyturia) has been studied as a diagnostic marker for preeclampsia. We sought to validate its use in preeclampsia and in differentiating it from other high risk pregnancy states [2]. Serum cystatin C (Cys C) has been proposed as a simple, accurate, and rapid endogenous marker of glomerular filtration rate (GFR) in research and clinical practice. However, there are conflicting reports regarding the superiority of Cys C over serum creatinine (Cr). [3]

Other biochemical markers that have been used in diagnosis and monitoring of PE include serum creatinine and urate. These low molecular weight substances are used to monitor renal function in established PE. However, the usefulness of serum creatinine as a marker for glomerular filtration rate (GFR) is limited by the influence of an individual's muscle mass, by the tubular secretion and reabsorption, by dietary intake and by analytical difficulties [4]. Pre- Eclampsia Globally, Causes: Symptoms: 10% of all Damage to the Rising High blood pregnancies blood vessels pressure insufficient blood High protein levels12% of maternal flow to the uterus in the urine deaths severe headache 1/3rd of pre maturebirths Visual Disturbances Vomiting and abdominal pain. **Women with** mild pre-eclampsia may not show any symptoms, and the condition is usually only discovered during routine antenatal appointments (through standard blood pressure checks and urine samples). Preeclampsia generally resolves spontaneously within 12 wk after delivery whereas

proteinuria due to other renal disease does not. New-onset proteinuria after 20 wk of gestation together with new-onset hypertension is a strong indicator of preeclampsia. The severity of proteinuria does not correlate with the severity of preeclampsia and can even be absent in 10% of the cases.

## 2. Materials and Methods

The study was conducted at International Hospital between May to August 2015. Serum was then frozen and saved. The pregnancy was dated from the last menstrual period (LMP) or from the early dating ultrasound scan if there was a difference of more than 2 weeks.

### 2.1 Study Design

This is cross sectional study of 100 female diagnostic pregnant. The serum levels were therefore determined in samples from 50 control women at term as well as in 50 samples of patients with preeclampsia (diastolic blood pressure >90 mmHg; urinary albumin excretion >300 mg/L).

**2.2 Inclusion criteria:** For high-risk group were diagnoses of preeclampsia, chronic hypertension (HTN), gestational HTN

**2.3 Exclusion criteria:** Patients under the age of 34 and absence of the above-mentioned diagnosis

### 2.4 Sample collection analysis

Blood samples were collected from women at the time their anomaly scan, between 19 and 23 weeks gestation. About (5 ml) of venous blood was collected under a septic precaution in a sterile plain container from selected subjects. And where been centrifuged. The concentration of Cystatin C was estimated by auto- biochemical equipment (Mista- I2) with specific reagent called Cystatin C reagent and Creatinine were estimated using Munday equipment.

### 2.5 Statistical analysis

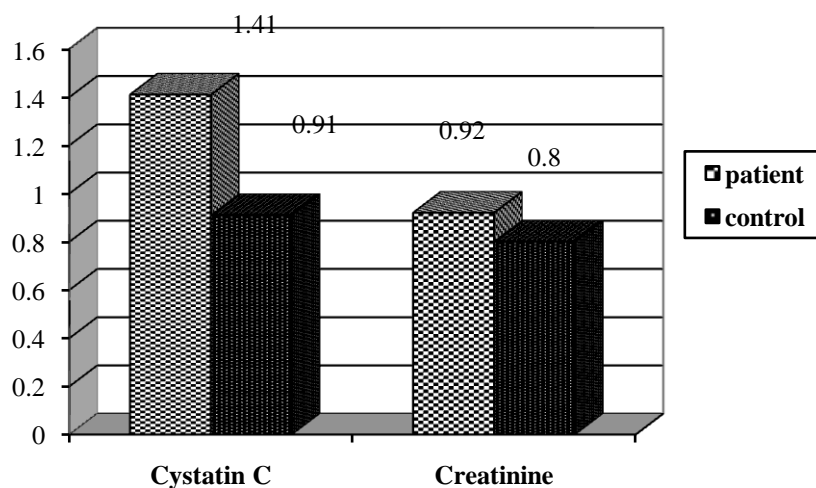
Statistical analysis was performed using statistical package for social science (SPSS) software, evaluation of patient’s data was performed using the t-test.

## 3. Results

**Table 1: Comparison of various biochemical parameters between control pregnant females (controls) and pre-eclampsia patients (cases)**

Measured units	Means ± SD		p- value
	Patients No. =( 50)	Control No. =(50)	
Cystatin C (mg/L)	1.41 ± 0.3	0.91 ± 0.2	0.000
Creatinine (mg/dl)	0.92 ± 0.08	0.8 ± 0.07	0.706

The P-value of Serum Cystatin C, Creatinine levels was 0.0 0.000, 0.706 respectively.



**Fig (1) comparison of various biochemical parameters between control pregnant females (controls) and pre-eclampsia patients**

## 4. Discussion

Preeclampsia affects 2%-8% of pregnancies and is defined as the combination of pregnancy induced hypertension and proteinuria, re-eclampsia can range from mild to severe [5]. If pre-eclampsia goes from mild to severe, it starts to affect other systems of your body as it worsens. This means you may get more serious symptoms as the condition sets in,

and you may need to go to intensive care or a maternity high dependency unit. The result of study found that, Serum Cystatin C levels was significantly higher in patients with pre-eclampsia than control pregnant females; the meaning was  $1.41 \pm 0.3$  and  $0.91 \pm 0.2$ . On the other hand the serum creatinine levels were insignificant in patients with pre-eclampsia and control pregnant females. The meaning was  $0.92 \pm 0.08$  and  $0.8 \pm 0.07$  respectively; and this result similar to Sharma *et al*[6] which reported that the Serum cystatin C concentrations were significantly higher in pre-eclamptic patients ( $1.31 \pm 0.4$  mg/L) compared to the control pregnant females ( $0.96 \pm 0.2$  mg/L) with p value of  $<0.001$ (highly significant).[6] A high level of Cystatin C in the blood corresponds to a decreased glomerular filtration rate (GFR) and hence to kidney dysfunction. Since Cystatin C is produced throughout the body at a constant rate and removed and broken down by the kidneys.

## 5. Conclusion

This study concluded that serum Cystatin C levels was significantly than control, (P. value 0.000). Creatinine levels was insignificant in patients with pre-eclampsia and control pregnant females (p-value 0.706); and should be routinely included in the investigative work up of these patients.

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