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Original Research Article

Predictive Utility of Serum Ca-125 as a Biomarker in Pre-Eclampsia

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Abstract

Objective: The present study aims to determine the positive predictive utility of CA-125 as a biomarker in women destined to develop pre-eclampsia.

Method: After taking proper informed consent a total of 140 singleton pregnant females at or after 20 weeks were assessed for serum CA-125 at 20 weeks and followed up to term. The patients of pre-eclampsia formed one comparison group against non-pre eclamptic group.

Result: There appears a strong co-relation between values of CA125 and incidence of pre-eclampsia as demonstrated by the table above and graph besides. The P value is <0.001, which is highly significant. In our study, the mean CA125 levels was 11.44 ± 4.89 IU/ml. In comparison to controls, preeclampsia patients' mean CA125 levels were considerably higher, at 49.49 ± 21.0 IU/ml (p 0.001).

Conclusion: Preeclamptic females had a mean CA-125 concentration that was substantially higher than that of normal pregnancies. A correlation between CA-125 level and the degree of pre-eclampsia was found to be positive. There exists a positive co-relation between levels of CA125, Systolic Blood Pressure, Diastolic Blood pressure, Serum uric acid and Serum Creatinine, all of which are predictors of pre-eclampsia.

Keywords: CA-125, Pre-Eclampsia, Blood Pressure, Proteinuria.

Introduction

One of the main causes of maternal and neonatal morbidity and mortality is pre-eclampsia. [1] According to the examined population and the clinical definitions of pre-eclampsia, reported rates range from 3.0 to 10%. [2,3]

The most important function of CA125, a cell-surface mucin-like coelomic antigen, in modern obstetrics and gynaecology is the early detection and monitoring of epithelial ovarian cancer.[4] However, CA125 levels are not just indicative of ovarian cancer as values above 35 IU/ml have been observed in healthy pregnant and non-pregnant women as well as in benign gynaecological diseases. As a result, it is the subject of extensive research as a useful marker for diseases other than ovarian cancer. [5-7] There is a dearth of information regarding CA125 and its connection to preeclampsia. The purpose of the current study is to compare the levels of CA125 antigen in preeclamptic and normal

pregnancies in order to ascertain whether there is any correlation between them with the condition and whether it may be utilised as a diagnostic marker.

Materials and Method

Study design: Prospective Comparative study.

Source of data: Cases included all women with singleton pregnancy who attended the antenatal visits at 20 weeks of gestation. They were assessed for CA-125 and will be followed up to term.

Study duration: From January 2021 to June 2022

Inclusion criteria

1. Pregnant women attended to in antenatal clinic, labour ward and emergency unit at 20 weeks of gestation.
2. Singleton pregnancy without any prior knowledge of congenital anomaly or chromosomal abnormality.
3. Pregnant women who had given a written consent.

Exclusion criteria

1. Pregnant women with chronic hypertension
2. Pregnant women with peripheral vascular disease
3. Pregnant women on antihypertensive treatment
4. Pregnant women with kidney and heart disease
5. Pregnant women with coexisting TB in pregnancy, ovarian cyst and fibroids in pregnancy
6. Pregnant women with h/o ART, adnexal masses.

Method

A total of 140 singleton pregnant females at or after 20 weeks were assessed for CA-125 at 20 weeks and followed up to term. The patients of pre-eclampsia formed one comparison group against non-pre eclamptic group.

An informed written consent was obtained from all participants after explanation of the purpose and methodology of the research. Using a structured proforma, relevant data was obtained such as the socio-demographic characteristics, parity and estimated gestational age (EGA) was calculated based on the last menstrual periods of the participants or from early ultrasound scan done. The medical history, previous obstetric history and treatment regimens received was noted.

Pregnancy outcome was obtained by extracting information about the antenatal, labour, delivery, and new-born notes from the delivery records. Foetal outcomes such as the birth weight, intrauterine demise and special care baby unit admissions was noted.

Systolic and diastolic blood pressures measurements were taken with a standard mercury sphygmomanometer and measured to the nearest 10mmHg of mercury. The protein in urine was tested for using urine dipstick. The CA125 sample was obtained by collecting 5ml of venous blood from the participants under aseptic condition via venepuncture using a 5ml sterile disposable syringe and needle into a Lithium heparin bottle and transported from the point of collection (Labour ward, emergency room and/or lying-in ward) to the central research laboratory of the hospital where it was centrifuged for 10 minutes at 2000rpm using a refrigerated centrifuge. The resulting supernatant (i.e plasma) was transferred into clean polypropylene tubes using a Pasteur pipette in 0.5mls aliquots and stored in the freezer at a temperature of -20^{O}C until the sample size achieved following which analysis was carried out. The CA125 levels was then assayed enzymatically with the ELISA (enzyme linked immunosorbent assay) method using reagents obtained from

the manufacturer.

Observation and Results

A total of one hundred and forty gravid women were enrolled in the forementioned study. Out of which, 70 (50%) had symptoms of preeclampsia whilst the remaining 70 (50%) were normal uncomplicated pregnancies, with respect to blood pressure, proteinuria, and biochemical tests. The mean age group of all patients in the pre-eclampsia group was 25.04 ± 4.27 years, while, the control group had a mean age of 25.31 ± 3.59.

43% of the patients presented with as para 1 while 29% presented as nullipara. 14% patients presented with Para 2 while the rest 14% presented as multipara.

A majority of patients with pre-eclampsia were diagnosed during 33-40 weeks of gestation (61 cases; 87%). 1 case presented at <28 weeks while 2 cases presented at > 40 weeks of gestation.

A majority of patients (60%) presented as primi-gravidas, while the rest 40% presented as multi-gravidas.

Table 1: Blood Pressure

Blood Pressure (mmHg)	Cases Frequency (n), (%)	Control Frequency (n), (%)	*p* Value
<140/90	--	69 (98.5%)	
140/90 to <160/110	43 (61.5%)	1 (1.5%)	**<0.001**
>160/110	27 (38.5%)	--	

Proteinuria (g/dL)	Cases Frequency (n), (%)	Control Frequency (n), (%)	*p* Value
0	--	70 (100%)	**<0.001**
+1	--	--	
+2	49 (70%)	--	
+3	21 (30%)	--	

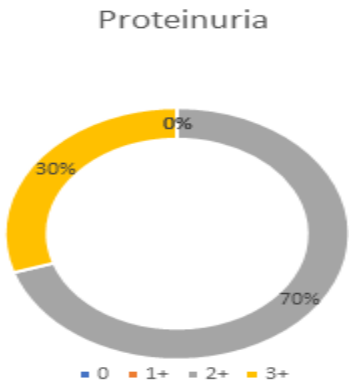


Table 2: Serum Uric Acid

Serum Uric Acid (mg/dL)	CasesFrequency (n), (%)	Control Frequency (n), (%)	*p* Value
2.0 – 4.0	15 (21.5%)	61 (87%)	<0.001
4.1 – 6.0	38 (54.5%)	9 (13%)	
6.1 – 8.0	14 (20%)	--	
8.1 – 10.0	3 (4%)	--	

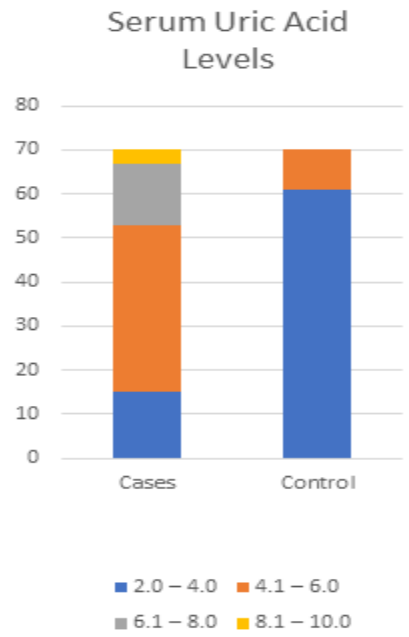


Table 3: Serum Creatinine

Serum Creatinine (mg/dL)	Cases Frequency (n), (%)	Control Frequency (n), (%)	*p* Value
< 1.1	22 (31.5%)	50 (71.5%)	
1.1 – 2.9	43 (61.5%)	20 (28.5%)	
> 3.0	5 (7%)	--	0.039

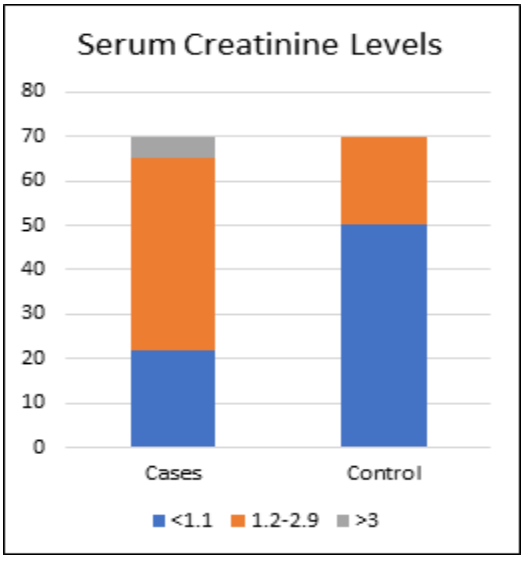
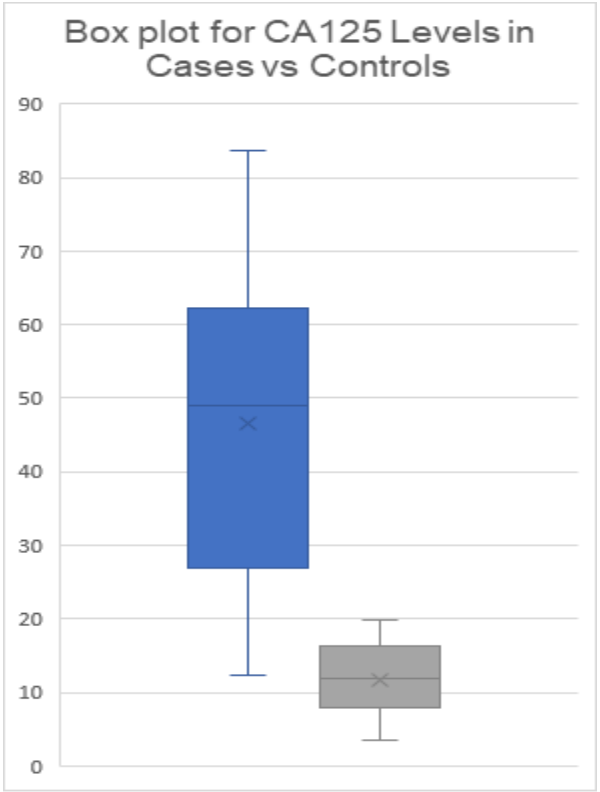


Table 4: CA 125

Group	Lowest CA125 Level (IU/mL)	Highest CA125 Level (IU/mL)	Mean Serum CA125 (IU/mL)	*p* Value
Pre-eclampsia group (Cases)	12.45	84.72	49.49 ± 21.0	<0.0001
Control	1.50	19.28	11.44 ± 4.89	

Difference	**38.050**
Standard error	2.577
95% CI	43.1458 to 32.9542
t-statistic	14.764
DF	138
Significance level	P < 0.0001

There appears a strong co-relation between values of CA125 and incidence of pre-eclampsia as demonstrated by the table above and graph besides. The P value is <0.001, which is highly significant.



Pearson's linear co-efficient of correlation between CA125 and Clinico-laboratory parameters of patients with pre-eclampsia and controls:

Parameters	Pearson's Co-efficient of Correlation (r)	*p*
Systolic BP	0.350	<0.001
Diastolic BP	0.339	<0.001
Proteinuria	0.320	0.002
S. Creatinine	0.335	0.001
S. Uric Acid	0.103	0.001

Discussion

Out of 140 patients that included in the study, the mean age group of all patients The mean age group of all patients in the pre-eclampsia group was 25.04 ± 4.27 years, while, the control group had a mean age of 25.31 ± 3.59.

In a study conducted by Rekha Reddy et. al. [8] conducted a study with 100 preeclamptic women. The mean age of the patients was 26.46 years.

In a study conducted by Villar *et al*. [9] 11% of all first pregnancies (or 5% of all pregnancies overall) are complicated by hypertension. About half of these are brought on by or connected with pre-eclampsia.

In comparison to the cases' parity and gestational age, the controls were normotensive females. In our study, the mean CA125 levels was 11.44 ± 4.89 IU/ml. This data supports the findings of the Niloff et. al. [8] study, which showed that in healthy, uncomplicated pregnancies, CA125 levels are increased in the first trimester, decline, and remain below 35IU/ml throughout the remainder of the pregnancy, including just before delivery. [12,15] The CA125 levels of the controls in the Cebesoy and Karaman studies [10,11] were also low, at 14.64 IU/ml and 17.2 IU/ml, respectively.

In comparison to controls, preeclampsia patients' mean CA125 levels were considerably higher, at 49.49 ± 21.0 IU/ml (p 0.001). Similar studies have been conducted by Mustafa *et al*. [12] , Cebesoy *et al*. [10] , and Karaman *et al*. [11], all of which found that CA125 is raised in preeclampsia, and more specifically, severe preeclampsia. The average blood CA125 concentration in the Mustafa *et al*. study was 55.70 ± 8.72 IU/ml for men and 59.11 ± 4.28 IU/ml for women.

Conclusion

According to this study, preeclamptic females had a mean CA-125 concentration that was substantially higher than that of normal pregnancies. Additionally, a correlation between the CA-125 level and the degree of preeclampsia was found to be positive. Clarification of the clinical applicability of CA-125 as a preeclampsia prediction requires more study.

There exists a positive co-relation between levels of CA125, Systolic Blood Pressure, Diastolic Blood pressure, Serum Uric acid and Serum Creatinine, all of which are predictors of pre-eclampsia.

Further research needs to be done in order to co-relate the grade of pre-eclampsia with the aforementioned parameters with a larger study population.

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