STUDY ON C-REACTIVE PROTEIN IN CASES OF PRE-ECLAMPSIA

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ABSTRACT

BACKGROUND

Pre-eclampsia is one of the most frequent obstetric complication occurring in about 5% to 10% of pregnancies. It is one of the leading causes of maternal and perinatal morbidity and mortality. C-reactive protein is a marker of tissue damage and inflammation and was proposed to play a role in eliciting the inflammatory response characteristic of pre-eclampsia.

The objective of this study is- C-reactive protein, a sensitive marker of tissue damage and inflammation was proposed to play a role in eliciting the inflammatory response characteristic of preeclampsia. The present study is directed towards determining the association of serum C-reactive protein and preeclampsia.

The aim of this study is this study on C-reactive protein in preeclampsia will serve as standard guideline for this part of the country.

MATERIALS AND METHODS

The study has been conducted in the Dept. of Obstetrics and Gynaecology, Patna Medical College and Hospital, Patna. Serum estimation of C-reactive protein was done in Dept. of Biochemistry in diagnosed cases of pre-eclampsia by turbidimetric method; 150 women of pre-eclampsia were selected as study group and 50 normotensive pregnant women were selected as control group. All women were in the age group of 20 - 35 yrs. and were in 3rd trimester of pregnancy.

Statistical Analysis- Descriptive data were presented as mean $\pm$ SD and range values. Comparison between the control group and study group was done by Chi-square test. For all the tests, the probability value (p-value) of less than 0.05 was considered statistically significant.

Study Design- Observational study.

RESULTS

The incidence of pre-eclampsia is higher in primi gravida and women of low socioeconomic status. The mean systolic blood pressure was of 117.88 mm of mercury in control group and 163.37 mm of mercury in study group. The mean diastolic blood pressure in control group was 74.44 mm of mercury and 108.50 mm of mercury in study group. Range of C-reactive protein was quite high in cases of the study group (30.12 - 90 mg/L) than the control group (2.2 - 16.15 mg/L).

CONCLUSION

Among various markers of inflammation in pre-eclampsia, C-reactive protein is strongly associated with inflammatory process and is a sensitive index of overall inflammatory activity in the body as CRP is markedly elevated in cases of pre-eclampsia.

KEYWORDS

Preeclampsia, Inflammatory Response and C-Reactive Protein.

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BACKGROUND

Pre-eclampsia is one of the most frequent obstetric complication occurring in about 5% to 10% of pregnancies. It is one of the leading causes of maternal and perinatal morbidity and mortality. According to WHO, systemic review hypertensive disorder contributes to 16% of maternal mortality.

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ACOG, task force on hypertension in pregnancy in its report (2013) described preeclampsia as an evolving, dynamic and multisystemic process. Hypertensive disorder of pregnancy represents a group of conditions and is classified as gestational hypertension preeclampsia, chronic hypertension and preeclampsia superimposed on chronic hypertension.

Pre-eclampsia is characterised by systolic blood pressure equal to or more than 140 mmHg and diastolic blood pressure equal to or more than 90 mmHg with proteinuria (≥ 300 mg/ 24 hrs. dipstick 1+) in a previously normotensive patient.

As evidenced by many studies, pre-eclampsia is a disorder associated with generalised dysfunction of endothelial cells. This endothelial dysfunction is proposed to be a part of an exaggerated maternal inflammatory response to pregnancy. There are numerous markers like activated complement, cytokines, tumour necrosis factor α (TNF α), interleukins and C-reactive protein, etc. which have been identified to detect

low-grade systemic inflammation. Among the various markers of inflammation, C-reactive protein is a strongly associated marker with inflammatory process and is a sensitive index of overall inflammatory activity in the body.

Among various markers of inflammation in pre-eclampsia, C-reactive protein is strongly associated with inflammatory process and is a sensitive index of overall inflammatory activity in the body (Kluft C, De Maat et al 2002).¹

Many studies have hypothesised that hypertension may be the result of an inflammatory disorder. Higher levels of C-reactive protein may increase blood pressure by reducing nitric oxide production in endothelial cells causing vasoconstriction and increasing endothelin-1 (Sesso HD, Burning JE, Rifai N, et al 2003).²

C-reactive protein, a sensitive marker of tissue damage and inflammation was proposed to play a role in eliciting the inflammatory response characteristic of preeclampsia. The present study is directed towards determining the association of serum C-reactive protein and preeclampsia.

Study on C-reactive protein in preeclampsia will serve as a standard guideline for this part of the country.

MATERIALS AND METHODS

The study has been conducted in the Dept. of Obstetrics and Gynaecology, Patna Medical College and Hospital, Patna. Serum estimation of C-reactive protein was done in Dept. of Biochemistry in diagnosed cases of pre-eclampsia.

The pregnant women for this study were divided into two groups.

Group- I 50 cases of healthy pregnant normotensive women were selected as control group in age group of 20 - 35 yrs.

Group- II 150 cases in the age group of 20 - 35 were selected for study from antenatal clinic, labour room and indoor of Obst and Gynae Dept., Patna Medical College, Patna.

Only 50 cases were taken as control to cut the cost of biochemical investigation.

All the women were in the third trimester of pregnancy in both the study and control group.

Exclusion Criteria

Those patients who were taking drugs or suffering from chronic renal disease, liver diseases, diabetes mellitus, chronic hypertension, HIV infections were excluded from the study.

Study Plan

Both groups after taking their consent were subjected to a questionnaire. Thereafter sample of blood was taken for analysis and biochemical investigation was done.

Following details were collected from all the 200 study subjects (150 cases and 50 controls).

- Detailed history was taken from patient.
- General examination- Including blood pressure.
- Obstetrical examination.

Quantitative estimation of serum C-reactive protein was done by turbidimetric method.

Study Design- Observational Study.

Statistical method for analysis of the result- Data were presented as mean $\pm$ SD and range values. Comparison of control group and study group were done by chi-square test. For all the tests, the probability value (P-value) of less than 0.05 was considered statistically significant.

RESULTS

Cases	Primigravida	Multigravida	Total
Number	88	62	150
Percentage	58.67	41.33	100

Table 1. Distribution of Cases in Primigravidae and Multigravidae

Sl. No.	Groups	Low S.E.S		Middle S.E.S		High S.E.S	
		No. of Cases	%	No. of Cases	%	No. of Cases	%
1.	Control Gr	20	40	27	54	3	6
2.	Study Gr	90	60	59	39.33	1	0.006

Table 2. Distribution of Cases in Different Socioeconomic Groups

Sl. No.	Group	No. of Cases	Systolic B.P. (mmHg)			Diastolic B.P. (mmHg)		
			Range	Mean	SD	Range	Mean	SD
1.	Control Gr	50	100-130	117.88	9.67	60-90	74.44	7.81
2.	Study Gr	150	140-190	163.37	16.63	90-120	108.50	7.08

Table 3. Table showing Systolic and Diastolic Blood Pressure in Different Groups

Sl. No.	Group	No. of Cases	CRP Concentration (mg/L)				't'	'p'	Remark
			Range	Mean	SD	SEM			
1.	Control Gr	50	2.2-16.15	9.64	3.79	0.53	35.29	<0.001	Significant
2.	Study Gr	150	30.12-90.0	55.03	14.31	1.16			

Table 4. Table showing Range, Mean, SD, SEM 't' and 'p' Value of C-Reactive Protein (CRP) Concentration in Different Groups

Age in Yrs.	Control Group					Study Group CRP Concentration mg/dL					T and P Value	R
	CRP Concentration (mg/L)					CRP Concentration (mg/L)						
	No.	Mean	SD	SEM	Range	No.	Mean	SD	SEM	Range		
20-25	6	8.58	5.19	2.12	13.33	82	51.76	13.15	1.45	59.88	t=16.78 p=<0.001	s
26-30	30	9.23	3.68	.67	13.9	60	59.33	14.56	1.88	55.88	t=25 P=<0.001	s

Table 5. C-Reactive Protein in Control and Study Group according to Different Age Group

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(S- Significant)

DISCUSSION

Pre-eclampsia is a multisystem disorder that complicates 3% - 8% of pregnancies.

Study done on 150 patients of pre-eclampsia in which 88 cases (58.67%) were primigravida, while 62 cases (41.33%) were multigravida. This concludes that the majority of cases affected by pre-eclampsia were primigravida, which is similar with the finding of study conducted by Zenebe Woldie et al (2010).³

The incidence of pre-eclampsia ranges from 3% to 7% among primigravidae and 1% to 3% among multigravidas as documented by Uzan et al (2011).

In the present study, 60% cases of pre-eclampsia were from low socioeconomic status and 39.33% belonged to middle socioeconomic status, while only one case was of high socioeconomic status. Hence, according to this study majority of the patients affected by pre-eclampsia were of low socioeconomic group followed by middle socioeconomic group. This shows that there is statistically significant association of pre-eclampsia with socioeconomic group. This is similar to the finding of Zenebe Wolde et al [2010],³ whose study has shown that there is more prevalence of preeclampsia in patients of lower socioeconomic group.

Systolic blood pressure in control group ranged from 100 - 130 mmHg with mean value of 117.88 mmHg (SD 9.67). In study group, the systolic blood pressure ranged from 140 - 190 mmHg with mean value of 163.37 mmHg (SD 16.63).

The diastolic blood pressure range for control group was 60 - 90 mmHg with the mean value of 74.44 mmHg (SD 7.81). Among study group diastolic blood pressure ranged between 90 - 120 mmHg with the mean value of 108.50 mmHg (SD 7.08).

These findings are consistent to the findings of Sibai B and Dekker G et al (2005).⁴ This is also similar to study conducted by Uzan et al (2011) on pre-eclampsia, where all of the cases were having diastolic blood pressure $\geq$ 140/90 mmHg.

There are numerous markers like activated complement, cytokines, tumour necrosis factor (TNF α), interleukins and C-reactive protein, etc. which have been identified to detect low-grade systemic inflammation.

In present study, serum C-reactive protein were estimated in 50 normotensive pregnant (Control group) women and 150 clinically proven patients of pre-eclampsia (Study group).

In the present study, C-reactive protein value in control ranged from 2.2 mg/L to 16.16 mg/L with a mean value of 9.64 mg/L (SD 3.79). In the Study group, C-reactive protein value ranged from 30.12 to 90 mg/L with a mean value of

55.03 mg/L (SD 14.31). The 't' value was 35.29 and 'p' value was < 0.001 , which is significant statistically.

The mean CRP level was significantly higher in patients of study group in all age groups as compared to control with 'p' value < 0.001 .

Thus, serum C-reactive protein value was markedly raised in proven cases of pre-eclampsia than their control group, which is consistent with the findings of E Teran, C Escudro et al (2001), Tjoa MLvan Vugt et al (2003), Qiu C et al (2004), Delia M Paternoster et al (2006)⁵, Kumru et al (2006), I Batashki et al (2006), A Ghazavi et al (2008), Zacho J et al (2008),⁶ Mihiu D et al (2008)⁷ and Kazerooni et al (2009), A. Szarka et al (2010) and Nanda K et al (2012).⁸

CONCLUSION

Among various markers of inflammation in pre-eclampsia, C-reactive protein is strongly associated with inflammatory process and is a sensitive index of overall inflammatory activity in the body as CRP is markedly elevated in cases of pre-eclampsia.

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