SJIF Impact Factor: 6.711

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 9
Issue: 8
Page N. 375-378
Year: 2025

Case Report www.wjahr.com

MATERNAL SERUM C-REACTIVE PROTEIN AS A PREDICTIVE MARKER FOR SPONTANEOUS PRETERM LABOR: A CASE-CONTROL STUDY

Lahaib Sadiq Al Bosaeeda*

Diploma of Gynecology and Obstetrics.

Article Received date: 20 June 2025 **Article Revised date**: 10 July 2025 **Article Accepted date:** 31 July 2025

***Corresponding Author: Lahaib Sadiq AlBosaeeda**

Diploma of Gynecology and Obstetrics.

ABSTRACT

Background: Preterm birth, defined as delivery before 37 completed weeks of gestation, is a major contributor to neonatal morbidity and mortality globally. Inflammation is implicated in the pathophysiology of spontaneous preterm labor. **Aim of study:** To evaluate the role of maternal serum C-reactive protein (CRP), an inflammatory biomarker, as a predictor of spontaneous preterm labor. **Patients and methods:** A case-control study was conducted involving 100 pregnant women, including 50 with spontaneous preterm labor (cases) and 50 with term labor (controls). Data on maternal age, body mass index (BMI), parity, mode of delivery, and neonatal APGAR scores were collected. Maternal serum CRP levels were measured and compared between groups. **Results:** There were no significant differences in age and BMI between cases and controls ($p=0.463$). Parity distribution significantly differed ($p=0.012$), with more primiparous women in the preterm group. Mode of delivery was similar in both groups ($p=0.317$). Neonates born to preterm labor cases had significantly lower APGAR scores at 1 and 5 minutes ($p < 0.001$). Serum CRP levels were significantly elevated in preterm labor cases (5.54 ± 2.43 mg/L) compared to controls (2.82 ± 1.71 mg/L) with $p < 0.001$. **Conclusion:** Elevated maternal serum CRP is strongly associated with spontaneous preterm labor, supporting its potential use as a predictive inflammatory marker. Early detection of increased CRP levels may aid in identifying women at risk and contribute to preventive strategies to reduce preterm birth and improve neonatal outcomes.

INTRODUCTION

Preterm is defined by the World Health Organization (WHO) as babies born alive before 37 weeks of pregnancy are completed. Preterm birth is divided into subcategories depending on gestational age: extremely preterm (less than 28 weeks), very preterm (28 to 32 weeks) and moderate to late preterm (32 to 37 weeks).[1]

Preterm birth is one of the most challenging and critical issues in obstetrics. Despite decades of study and therapeutic progress, roughly one out of every ten infants in the United States are born prematurely. These babies are responsible for almost three-quarters of prenatal death and more than half of long-term neonatal morbidity, at a huge social and economic cost.[2] Prematurity complications are the major cause of newborn mortality and the second greatest cause of death among children under the age of five.[3]

The most common causes of preterm labor include intrauterine infection or inflammation, vascular disorders, uterine overdistension (such as with multiple pregnancies), and maternal health conditions like hypertension or diabetes. Other significant contributors are a previous preterm birth, short cervical length, elevated fetal fibronectin levels, low maternal body mass index, poor nutrition, inadequate prenatal care, substance use, extremes of maternal age, genetic predispositions, and certain lifestyle factors such as smoking and high psychosocial stress. Pre-eclampsia, placental abruption, and uterine or cervical anomalies are also associated causes, though in many cases, preterm labor is considered a syndrome resulting from the interplay of multiple risk factors and mechanisms, including immunological and hormonal influences.[4][5]

This study was conducted aiming to evaluate the role of C-reactive protein as a marker for preterm labor.

PATIENTS AND METHODS

Study place and time

The study has been conducted in Baghdad/ Iraq. The data was collected from the 1st of July 2024 to the 1st of February 2025.

Study design
An analytic case control design has been chosen for this study.

Patients and method
A total number of 100 pregnant women at labor were included in the present study:

1. Case group: include 50 women with spontaneous preterm labor
2. Control group: include 50 women in term labor.

The Gestational age was calculated depending on the mother's LMP and first trimester ultrasound scan. Preterm birth was defined as birth at gestational age less than 37 weeks and term pregnancy ≥ 37 completed weeks.

Full history and thorough general and obstetrical examination were done for all pregnant women. Basic sociodemographic and obstetric data were collected (age, parity, gestational age, past medical history, pre-pregnancy BMI, and neonatal APGAR score).

An amount of 10 cc of blood was collected from pregnant women for general investigations:(CBC, RFT, LVT, TFT, Blood group and RH) and for serum CRP.

Exclusion criteria
Mothers with the following conditions were excluded:

a. Pregnancy-induced hypertension.
b. Preeclampsia.
c. Gestational DM.
d. Chronic diseases
e. Twin pregnancy.
f. Stillbirth.
g. Alcoholism
h. Smokers

Participants consent
Verbal consent has been obtained from all participants before data collection.

Data entry and analysis
Data entry was done using Microsoft Excel 2019. Data was recorded into different quantitative and qualitative variables for the purpose of analysis.

Analysis was done using statistical package for social sciences (SPSS version 26).

Data was summarized using measures of frequency (mean), dispersion (standard deviation), tables and graphs. A two-tailed p value of less than or equal to 0.05 was assigned as a criterion for declaring statistical significance.

RESULTS

The study sample
A total number of 100 participants were included in the study sample (50 cases and 50 controls).

Basic characteristics of the study sample
The comparison between cases (preterm labor) and controls shows no significant differences in age (p=0.463) and BMI (p=0.463), indicating similar demographic profiles. However, parity distribution differs significantly (p=0.012), with a higher proportion of primiparous women among cases (42.0%) compared to controls (15.7%), while controls have more women with 2–4 parity. Mode of delivery does not differ significantly between groups (p=0.317). Notably, APGAR scores at both 1 minute (7.2 vs. 8.4) and 5 minutes (7.5 vs. 9.1) are significantly lower in preterm labor cases than controls (p < 0.001).

Table 1: Comparison of basic characteristics between both study groups.

Parameter	Group		P value
	Cases (preterm labor)	Controls	
Age			
Mean ± SD	31.5 ± 7.6	32.2 ± 6.0	0.463
BMI			
Mean ± SD	22.4 ± 3.2	23.1 ± 3.6	0.463
Parity			
Primiparous	21	8	**0.012**
	42.0%	15.7%	
Para 2 – 4	17	27	
	34.0%	52.9%	
Para >5	12	16	
	24.0%	31.4%	
Mode of delivery			
Caesarian section	27	21	0.317
	54.0%	42.0%	
Normal vaginal delivery	23	29	
	46.0%	58.0%	
APGAR score 1st min			
Mean ± SD	7.2 ± 1.1	8.4 ± 1.3	< **0.001**

APGAR score at 5 min			
Mean ± SD	7.5 ± 0.8	9.1 ± 0.3	< **0.001**

Comparison of mean CRP levels between both study groups

The serum CRP levels are significantly higher in the preterm labor cases compared to the controls, with a mean ± SD of 5.54 ± 2.43 mg/L versus 2.82 ± 1.71 mg/L, respectively ($p < 0.001$).

Table 2: Comparison of mean CRP levels between both study groups.

Serum CRP	Group		P value
	Cases	Controls	
Mean ± SD	5.54 ± 2.43	2.82 ± 1.71	<0.001

Role of CRP for prediction of preterm labor

ROC analysis revealed that CRP was a significant predictor for preterm labor (AUC= 0.810, $P < 0.001$); as shown in Figure 1. The optimum cutoff value with the highest sensitivity+ specificity was found to be 5.38; as it had a sensitivity of 60%, specificity 92%, positive predictive value of 88%, negative predictive value of 69% as shown in the table below (Table 3.8).

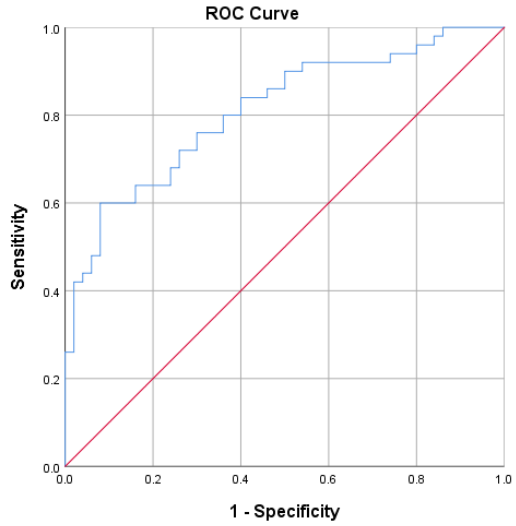

Figure (1): ROC analysis diagnostic indices of CRP for detection of preterm labor.

Table (3): Accuracy of a 5.38 cut-off point of CRP for detection of preterm labor.

CRP	Group		Total
	Cases	Controls	
≥5.38	30 TP	4 FP	34
<5.38	20 FN	46 TN	66
Total	50	50	100

*TP: True positive. FN: False negative. FP: False positive. TN: True negative.

DISCUSSION

This study found that serum CRP was significantly higher among cases of preterm labor. Moreover, a cut-off point of 5.38 had 60% sensitivity and 92% specificity.

Abdullah et al. In a study from Erbil, Iraq, elevated CRP levels (>1mg/l) in women with premature uterine contractions were significantly associated with preterm delivery. The sensitivity and specificity of CRP as a predictor were 98.9% and 66.7%, respectively.[6]

A case control study by **Shahriari et al.** identified a CRP cutoff value of >3.6mg/l with an AUC of 0.683 for predicting preterm labor, demonstrating a meaningful relationship between higher CRP and the risk of preterm labor.[7] This same study also found that CRP levels could predict response to tocolytic therapy at a cutoff of >1.8. The lower cutoff for treatment response suggests that even moderately elevated CRP levels may have clinical significance.[7]

The study by **Kim et al.** found preterm labor associated with CRP levels >4.4mg/l, yielding a sensitivity of 40% and specificity of 89%.[8]

The study by **Gahlot et al.** involving 132 pregnant women with singleton fetuses and symptoms of preterm labor found serum CRP to be a significant predictor of preterm delivery. This study reported sensitivity of 70.9%, specificity of 70%, positive predictive value of 74.5%, and negative predictive value of 66%.[9]

A case-control study by **Deo et al.** included 240 antenatal women (120 with premature rupture of membranes and 120 controls) revealed notably different metrics, with CRP demonstrating 100% sensitivity but only 50% specificity for diagnosing chorioamnionitis, with a positive predictive value of 29.27% and negative predictive value of 100%.[10]

The study by **Lohsoonthorn et al.** found that women in the highest quartile of CRP concentrations (≥7.5 mg/L) had approximately twice the risk of preterm delivery compared to those in the lowest quartile (<2.0 mg/L).[11]

Median CRP concentrations have been observed to follow a pattern associated with gestational age at delivery. The study by **Pitiphat et al.** demonstrated that women who delivered before 34 weeks showed significantly higher median CRP levels (5.0 mg/liter) compared to those delivering between 34-37 weeks (2.8 mg/liter) and those delivering at term (2.4 mg/liter). This suggests that CRP levels may not only predict preterm birth but also correlate with the degree of prematurity.[12]

CRP predicts preterm labor because it is an acute-phase protein produced by the liver in response to systemic inflammation, which is a key contributor to the pathogenesis of preterm birth. Elevated CRP levels in pregnant women reflect increased inflammatory activity and the release of pro-inflammatory cytokines such as IL-6 and TNF-α, which can stimulate uterine

contractions, cervical ripening, and membrane rupture, ultimately leading to preterm labor. This association is supported by studies demonstrating that higher maternal CRP concentrations are linked to a greater risk of preterm delivery, particularly in women with evidence of infection, chorioamnionitis, or other inflammatory conditions, suggesting that CRP serves as a marker for these underlying inflammatory pathways that precipitate preterm labor.[13][7]

REFERENCES

1. Blencowe H, Cousens S, Oestergaard MZ, Chou D, Moller AB, Narwal R, et al. National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. Lancet (London, England), 2012; 379(9832): 2162–72.
2. American College of Obstetetrics and Gynecologists. Prediction and Prevention of Spontaneous Preterm Birth: ACOG Practice Bulletin, Number 234. Obstet Gynecol, 2021; 138(2): e65–90.
3. World Health Organization. WHO recommendations on interventions to improve preterm birth outcomes, 2015.
4. Khandre V, Potdar J, Keerti A. Preterm Birth: An Overview. Cureus, 2022; 14(12): e33006.
5. Stewart A, Graham E. Preterm birth: An overview of risk factors and obstetrical management. Dev Disabil Res Rev., 2010; 16(4): 285–8.
6. Najat Nakishbandy BM, Barawi SAM. Level of C - reactive protein as an indicator for prognosis of premature uterine contractions. J Prenat Med., 2014; 8(1–2): 25–30.
7. Shahshahan Z, Rasouli O. The use of maternal C-reactive protein in the predicting of preterm labor and tocolytic therapy in preterm labor women. Adv Biomed Res., 2014; 3: 154.
8. Kim MA, Lee BS, Park YW, Seo K. Serum markers for prediction of spontaneous preterm delivery in preterm labour. Eur J Clin Invest, 2011; 41(7): 773–80.
9. Gahlot K, Pandey K, Singh PP, Gahlot V, Mourya R. To evaluate diagnostic efficacy of maternal serum C-reactive protein to predict preterm labour. Int J Reprod Contracept Obs Gynecol, 2016; 5: 4001–4.
10. Deo S, Jaiswar SP, Sankhwar PL, Kumari P, Singh S. Evaluation of CRP as a preindicative marker in women with Preterm Labour and Preterm Prelabour Rupture of Membrane (PPROM). Int J Life-Sciences Sci Res., 2016; 2(4).
11. Lohsoonthorn V, Qiu C, Williams MA. Maternal serum C-reactive protein concentrations in early pregnancy and subsequent risk of preterm delivery. Clin Biochem, 2007; 40(5–6): 330–5.
12. Pitiphat W, Gillman MW, Joshipura KJ, Williams PL, Douglass CW, Rich-Edwards JW. Plasma C-reactive protein in early pregnancy and preterm delivery. Am J Epidemiol, 2005; 162(11): 1108–13.
13. Bullen BL, Jones NM, Holzman CB, Tian Y, Senagore PK, Thorsen P, et al. C-reactive protein and preterm delivery: clues from placental findings and maternal weight. Reprod Sci., 2013; 20(6): 715–22.