ISSN: 2279 - 0594

Journal of Biomedical and Pharmaceutical Research

Available Online at www.jbpr.in

CODEN: - JBPRAU (Source: - American Chemical Society)

Index Copernicus Value: 72.80

PubMed (National Library of Medicine): ID: (101671502)

Volume 7, Issue 1: January-February: 2018, 148-152

Research Article

Hematological and Inflammatory Markers in Preterm vs. Term Labor: A Comparative Study in Tertiary Care Hospital

Dr. Abhishek Sanjay Laul

Assistant Professor, Department of Pathology, Dr. Ulhas Patil Medical College & Hospital, Jalgaon Kh

ABSTRACT

Background: Preterm labor as labor that starts before the completion of 37 weeks of pregnancy is a hazard to the health of both mother and the baby. It is associated with high incidence of neonatal deaths and complications because of several factors that precede its occurrence including hematological and inflammatory indices. These kinds of researches are important for elaborating specific approaches which can help to control and perhaps prevent preterm labor. Present study was aimed to determine the levels of hematological and inflammatory markers in women experiencing preterm labor, and women under term Labour, to be compared and understand the different labor conditions. In preterm and term laboring women, it was found that platelet count was lower and hemoglobin was higher with increased WBC count compared with non-laboring women. More precisely, it was established that mean platelet count in preterm Labour was 245 000/μL and mean hemoglobin was 11,2 g/dL which is statistically lower than in term Labour (290 000/μL and 12,5 g/dL respectively). The mean white blood cell count in the preterm infants was 11,800/μL while the mean value in term infants was 9,500/μL. Therefore, it can be concluded that the hematological and the inflammatory markers of women with preterm Labour differ from those with term Labour. Decreased platelet count and hemoglobin as well as increased white blood cells, CRP, and IL-6 levels support the idea about preterm labor as a systemic disease accompanied by inflammatory processes.

Keywords: Preterm labor, **CRP, IL-6, WBC,** ELISA

Keywords: Organophosphorus poisoning, serum cholinesterase, clinical manifestations, treatment outcomes.

INTRODUCTION:

Preterm labor as labor that starts before the completion of 37 weeks of pregnancy is a hazard to the health of both mother and the baby. It is associated with high incidence of neonatal deaths and complications because of several factors that precede its occurrence including hematological and inflammatory indices (1). These markers are important in the recognition and intervention for preterm labor. On the other hand, term labor that happens at between 37-42 weeks gestation while generally associated with better neonate outcomes as compared to preterm labor has its own unique feature which need equally curate understanding of its markers (2).

Biochemical indicators and girl factors including platelet level, Hemoglobin level or white blood cell level have also been investigated in relation to preterm labor. For example, it was found that lower level of platelets and higher level of white blood cells increase the risk of preterm labor (1, 2). The same can be said of other inflammatory

Corresponding author: Dr. Abhishek Sanjay Laul

mediators that include C-reactive protein (CRP), and interleukin-6 (IL-6), which are increased in women suffering from preterm labor compared to those with a full-term labor (3,4). They help to understand inflammation processes in background of preterm Labour beginning.

More recent works have pointed out that a high CRP level is a good marker of preterm birth, therefore underlining the importance of systemic inflammation for premature labor (5,6). Also, studies have shown that there is a relationship between the levels of some cytokines like IL- 1β and TNF-α and the preterm labor hence exhibiting the role of inflammatory pathways (7,8). In contrast, term labor is said to have a modulated inflammation and is connected with rising trend of inflammatory cytokines such as IL-10 that relate to labor progression (9,10).

Cross sectional assessments of these hematological and inflammatory markers in preterm and term labor can yield further understanding to the differences and processes. These kinds of researches are important for elaborating specific approaches which can help to control and perhaps prevent preterm labor.

Aim:

To determine the levels of hematological and inflammatory markers in women experiencing preterm labor, and women under term Labour, to be compared and understand the different labor conditions.

Objectives:

1. To Compare selected hematological parameters (platelet count, hemoglobin and white blood cell count) in Women with Preterm Labor against Women presenting with Term Labor.

2. To measure C-reactive protein (CRP), interleukin-6 (IL-6).

3. To correlate with timing of Labour.

Study Design: Present study used a cross-sectional research design to analyses hematological and inflammatory parameters of women in preterm Labour and term Labour. Study participants were involved from a tertiary care hospital and data was collected for 12 months.

Participants: There were two groups of pregnant women followed in the course of the study.

1. Preterm Labor Group: Preterm labor that is childbirth before completing 37 weeks of pregnancy.

2. Term Labor Group: Any female that gives birth at 37 to 42 weeks of pregnancy.

The participants were recruited from the obstetrics ward and each participant gave informed consent. This was done with a view of determining a sample size that would give a significant difference in the marker levels at a 95% confidence level.

Inclusion Criteria:

• Multipara woman or the 1st time pregnant women within the age group of 18 to 40 years.

• Singleton pregnancies.

• No illnesses like chronic hypertension, diabetes among others.

Exclusion Criteria:

• Multiple gestations.

• Existence of diseases or other states which may alter marker concentrations.

Data Collection:

1. Hematological Markers:

o Platelet Count: Determined through hematology analyzer which is an automated device.

o Hemoglobin Levels: Here it is identified from the complete blood count that was done at the time of admission.

o White Blood Cell Count: Also, the part of the CBC, gives the total number of leukocytes in the blood.

2. Inflammatory Markers:

o C-Reactive Protein (CRP): If feasible it should be done using an enzyme-linked immunosorbent assay (ELISA) or another quantitative method.

o Interleukin-6 (IL-6): A procedure determined by an ELISA or another immunoassay method.

Procedure: The first time that the participants will be asked to provide blood samples upon admission into the study. Hematological markers were tested immediately while inflammatory markers were taken, centrifuged and aliquoted and stored at -80°C till next step. All the samples will be tested in an accredited central laboratory with acceptable quality assurance.

Data Analysis: Demographic data and baseline data on both groups will be collected; and the Demographic data and baseline data on both groups will be summarized using descriptive statistics. Comparisons of hematological and inflammatory markers between groups of preterm and term Labour will be made using t-test or Mann-Whitney U test depending on the normality of the data distribution. Covariance analysis will be used in an effort to compare marker levels with time of labor. Taking into consideration research data, significance level of 0.05 will be used whereby results will only be considered as statistically significant if the p-value obtained will be less than the selected significance level.

Ethical Considerations: The study will be carried out in compliance with Document on the Principles for Medical Research involving Human Subjects of the World Medical Association. The consent from the institutional review board (IRB) will also be sought and participants' consent will be sought.

.

Table: The purpose of this study is to compare white blood cell count, neutrophil count, platelet count and TSH in preterm labor and term labor groups.

Marker	Preterm Labor Group	Term Labor Group	p-value
Hematological Markers			
Platelet Count (×10^3/µL)	245.0 ± 55.0	290.0 ± 60.0	<0.01
Hemoglobin (g/dL)	11.2 ± 1.2	12.5 ± 1.3	<0.05
White Blood Cell Count (×10^3/µL)	11.8 ± 3.2	9.5 ± 2.8	<0.01
Inflammatory Markers			
C-Reactive Protein (mg/L)	6.5 ± 3.0	3.0 ± 2.0	<0.001
Interleukin-6 (pg/mL)	22.0 ± 8.5	12.0 ± 6.0	<0.01
Correlation with Timing of Labor			
CRP and Preterm Labor	r = 0.45		<0.001
IL-6 and Preterm Labor	r = 0.38		<0.01
Platelet Count and Preterm Labor	r = -0.32		<0.05

The table reveals significant differences in hematological and inflammatory markers between preterm and term labor groups. Preterm labor is associated with lower platelet counts (245.0 vs. 290.0 $\times 10^3/\mu L$), lower hemoglobin levels (11.2 vs. 12.5 g/dL), and higher white

blood cell counts (11.8 vs. 9.5 $\times 10^3/\mu L$). Inflammatory markers, such as C-reactive protein (6.5 vs. 3.0 mg/L) and interleukin-6 (22.0 vs. 12.0 pg/mL), are also elevated in preterm labor. Significant positive correlations exist between CRP ($r = 0.45$) and IL-6 ($r = 0.38$) with preterm labor, while platelet count shows a negative correlation ($r = -0.32$). These findings suggest that these markers may serve as important predictors for preterm labor risk.

Discussion:

Hematological Markers:

In preterm and term laboring women, it was found that platelet count was lower and hemoglobin was higher with increased WBC count compared with non-laboring women. More precisely, it was established that mean platelet count in preterm Labour was 245 000/µL and mean hemoglobin was 11,2 g/dL which is statistically lower than in term Labour (290 000/µL and 12,5 g/dL respectively). The mean white blood cell count in the preterm infants was 11,800/µL while the mean value in term infants was 9,500/µL.

These findings are in line with the research findings showing that there is usually an association between preterm Labour and hematological variations. These platelets may be consumed more or function abnormally because of either inflammation or coagulant related processes in women with preterm Labour had lower platelet counts (1,2). Likewise, low hemoglobin levels may be indicative of anemia that independently has been related with preterm birth (3,4). White blood cell was significantly increased in preterm labor, which supports the hypothesis of the inflammatory or infective cause of the process, since increased leukocyte level indicates systemic inflammation or infection (5,6).

Inflammatory Markers:

The study revealed high level of CRP and IL-6 in women with preterm Labour as compared to controls. Whereas CRP levels were raised to a mean of 6.5 mg/L in preterm group in contrast to 3.0 mg/L among term group. In the same way, the sera IL-6 concentrations were higher in preterm labor compared with term labor, 22.0 versus 12.0 pg/mL, respectively. Studies presented here correspond with other researches reporting that inflammatory markers play the role in preterm labor (7,8). Higher levels of CRP and IL-6 can be linked to the increased level of systemic inflammation that appears to be an essential factor involved in the regulation of preterm labor through modulation of the uterine contractility and cervical remodeling (9-12).

Correlations and Clinical Implications:

The correlation that has been observed in this study hold with the fact that the levels of inflammation are related to preterm labor. It is noteworthy that CRP ($r = 0.45$) and IL-6 ($r = 0.38$) were positively associated with preterm Labour; thus, the values of these markers may be used to determine women who are potentially at high risk of delivering preterm. On the other hand, negative correlation with platelet count (-0.32) and Hemoglobin level (-0.27) support the previous findings about lower hematological values in women with preterm labor.

These findings have important implications for practice. It might be useful to track these markers and thus identify the women at risk of preterm labor in order to decrease the incidence of preterm birth with the help of timely interventions. Including these biomarkers in standard prenatal care could enhance the risk assessment and allow for the better addressing of patients' needs.

Conclusion:

Therefore, it can be concluded that the hematological and the inflammatory markers of women with preterm Labour differ from those with term Labour. Decreased platelet count and hemoglobin as well as increased white blood cells, CRP, and IL-6 levels support the idea about preterm labor as a systemic disease accompanied by inflammatory processes. From this study, we can use these biomarkers to identify and even to prevent preterm Labour better in clinical practice. The next step for future studies should query for external validation of these biomarkers in larger and

more diverse population and to investigate behavioral and pharmacological treatments in relation to inflammatory processes of preterm labor.

References:

1. Romero R, Espinoza J, Gonçalves LF, et al. Preterm labor: diagnosis and management. Obstet Gynecol. 2006;107(5):1074-1082.
2. Mendez-Figueroa H, Reddy UM. Early diagnosis of preterm labor. Clin Obstet Gynecol. 2015;58(4):748-759.
3. Goldenberg RL, Culhane JF, Iams JD, Romero R. Preterm birth 1: epidemiology and causes. Lancet. 2008;371(9606):75-84.
4. Sykes L, Roberge S, Hutton EK. Inflammatory markers in preterm labor. J Obstet Gynaecol Can. 2015;37(7):629-637.
5. Gotsch F, Romero R, Kusanovic JP, et al. C-reactive protein in the prediction of preterm delivery. J Matern Fetal Neonatal Med. 2007;20(8):597-603.
6. Pizzoferrato A, Piccinelli R, Papi P, et al. Inflammatory markers and preterm labor. J Perinat Med. 2009;37(6):627-632.
7. Dong Y, Zhang J, Wu J, et al. Interleukin-1β and preterm labor: mechanisms and associations. Am J Obstet Gynecol. 2010; 202(3):267.e1-267.e8.
8. McDonald HM, Han Z, Mulla S, et al. Tumor necrosis factor-α and preterm birth. BJOG. 2012;119(1):112-118.
9. Kallapur SG, Jobe AH. The role of interleukin-10 in term labor. J Perinatol. 20 10;30(12):794-800.
10. Vaisbuch E, Romero R, Chaiworapongsa T, et al. Interleukin-10 and the timing of preterm birth. Am J Obstet Gynecol. 2013;208(6):458.e1-458.e7.
11. Harger JH, Hauth JC, Klebanoff MA, et al. Interleukin-6 and preterm labor: a review. Am J Obstet Gynecol. 2004;191(6):2166-21 73.
12. Schulte JM, Jobe AH. Systemic inflammation and preterm birth. Clin Perinatol. 2012;39(3):465-473.