



**ORIGINAL RESEARCH PAPER**

**Obstetrics & Gynecology**

**COMPARISON OF TOTAL AND DIFFERENTIAL LEUCOCYTE COUNT IN DIFFERENT TRIMESTERS OF PREGNANCY AND AFTER DELIVERY**

**KEY WORDS:** Pregnancy, Trimester, Delivery, White cell count

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**ABSTRACT**

Pregnancy is characterized by changes in many physiological and hematological parameters. There is an increase in white blood cell count arising mainly from neutrophilia and to a lesser extent, monocytosis. This neutrophilia is attributed to physiological stress and it is known to increase with gestational age. The increase in the number of neutrophils is due to decrease in the activity of their apoptosis mechanism during pregnancy. During labour, there is further delayed in neutrophils apoptosis which leads to further increase of the WBC counts after normal vaginal delivery. It is important to note that leukocytosis even with mild left shift and some toxic granulations may not necessarily indicate an infection in women during pregnancy and in immediate puerperium. The aim of this study was to assess the changes in total and differential leukocytes counts in pregnancy in different trimesters and after delivery in comparison with non-pregnant controls. Our study shows a significant increase in WBC, Neutrophil, Lymphocyte and Monocyte counts with increase in gestational age and after delivery but Eosinophil and Basophils do not show any significant correlation with pregnancy.

**INTRODUCTION**

Pregnancy is a state characterized by many physiological hematological changes.<sup>1</sup> Physiological changes in pregnancy and puerperium are principally influenced by changes in hormonal milieu. WBC count is increased in pregnancy with the lower limit of the reference range being typically 6,000/cumm. Leukocytosis, occurring during pregnancy is due to the physiological stress induced by the pregnant state. Neutrophils are the major type of leucocytes on differential counts. This is likely due to impaired neutrophilic apoptosis in pregnancy. The neutrophil cytoplasm shows toxic granulation. Neutrophil chemotaxis and phagocytic activity are depressed, especially due to inhibitory factors present in the serum of a pregnant female. There is also evidence of increased oxidative metabolism in neutrophils during pregnancy .Immature forms as myelocytes and metamyelocytes may be found in the peripheral blood film of healthy women during pregnancy and do not have any pathological significance. They simply indicate adequate bone marrow response to an increased drive for erythropoiesis occurring during pregnancy. Lymphocyte count decreases during pregnancy through the first and second trimesters and increases during the third trimester. There is an absolute monocytosis during pregnancy ,especially in the first trimester ,but decreases as gestation advances .Monocytes helps in preventing fetal allograft rejection by infiltrating the decidual tissue (7<sup>th</sup>-20<sup>th</sup> week of gestation)possibly, through PGE2 mediated immunosuppression.<sup>2</sup>The monocyte to lymphocyte ratio is markedly increased in pregnancy .Eosinophil and basophil counts ,however ,do not change significantly during pregnancy. The stress of delivery may itself lead to brisk leukocytosis. Few hours after delivery ,healthy women have been documented as having a WBC count varying from 9,000 to 25,000/cumm. By 4 weeks post delivery ,typical WBC ranges are similar to those in healthy non pregnant women.

**OBJECTIVE OF THE STUDY**

The objective of the study is to evaluate the values of total and

differential leucocytes counts in normal pregnant women during pregnancy and after delivery.

**MATERIAL AND METHOD**

The cross sectional study was conducted in department of OBS &GYN, Jhalawar Medical College, Jhalawar. The study was approved by the ethical review committee of the institute. It was a cross sectional study done between June and July 2018. Written informed consent was obtained from all the participants. The total 150 blood samples from pregnant and delivered (normal vaginal and caesarean) women of 19 to 40 years were collected and 150 apparently healthy non-pregnant women of reproductive age volunteered were used as controls. Exclusion criteria included women who were ill, suffering from any bleeding disorder ,fever or any obvious infection , splenomegaly ,hypertension ,HIV, Hepatitis B . Data was collected from case files of the pregnant patients. Five ml. of venous blood was collected by venipuncture from each participant into Potassium EDTA bottles. The blood sample was analyzed within 2-3 hrs. of collection in the Hematology laboratory at Jhalawar Medical College Hospital, for CBC in automated cell counter.

**Statistical Analysis:**

The data generated was analyzed using the SSPS 20.0 (Trial version) software. Differences between the means in the group were assessed using the one-way ANOVA test and p value below 0.05(5%) were considered significant.

**RESULT**

The mean age of the case group was 25.42 years (S.D.4.74) and range between 19 and 40 years. The mean age of the non-pregnant control was 27.62 years (S.D.5.60) and a range of 19-42 years. In each group 30 cases have been selected. There was a significant increase in total leukocyte count and neutrophil count in pregnant women in comparison to control group.

Comparison of WBC count and Differential leukocytes counts in between the case groups

Parameter	1 <sup>st</sup> Trimester	2 <sup>nd</sup> Trimester	3 <sup>rd</sup> Trimester	Normal V.D.	LSCS
WBC	7.7597+/-1.22321	8.4553+/-1.89108	11.9603+/-2.65242	12.0660+/-3.66066	12.7973+/-3.51197
Neutrophil	5.3120+/-1.29157	6.1310+/-1.85168	9.5217+/-2.59144	9.4980+/-3.41915	10.6083+/-3.42712
Lymphocyte	1.7223+/-0.48303	1.5557+/-0.55927	1.7203+/-0.45174	1.7513+/-0.55547	1.3790+/-0.50579
Monocyte	0.5273+/-0.14913	0.5773+/-0.32937	0.6400+/-0.26257	0.7033+/-0.37889	0.8443+/-0.59369
Eosinophil	0.1063+/-0.12394	0.0907+/-0.09530	0.0713+/-0.6394	0.0553+/-0.05625	0.0600+/-0.08428
Basophil	0.0170+/-0.01512	0.0200+/-0.01390	0.0317+/-0.03333	0.0890+/-0.361555	0.0153+/-0.00819

**Comparison of mean WBC between the case groups:**

One -way ANOVA test was used with F value 21.300 and P value <0.0001, Significant. The F value obtained 21.3000, P value <0.05 which is significant.

Thus, the WBC count in all the groups are different.

**Comparison of mean Neutrophil count between case groups**

One-way ANOVA test was used with F value 23.248, P value

<0.0001.

F value obtained 23.248, P value <0.05 which was significant. Thus, the neutrophil value in all the groups was statistically different.

**Comparison of mean Lymphocyte count between the case groups**

One-way ANOVA test with F value 2.848, P value 0.026. F value was 2,848, P value <0.05, Significant. Thus, the Lymphocyte count between the case groups was statistically different.

**Comparison of mean Monocyte count between the case groups**

One-way ANOVA test was used with F value 2.848 P value 0.026, Significant. F value obtained was 2.848, P Value <0.05 which was significant.

Thus, the monocyte count between the groups was statistically different.

**Comparison of mean Eosinophil count between the groups**

One-way ANOVA test was used with F value 1.776, P value 0.137, Non-significant.

F value obtained was 1.776, P value >0.05, Non-significant.

**Comparison of total Basophil count between the case groups**

One way ANOVA test was used with F value 1.095, P value 0.362, Non-significant. Eosinophil and Basophil did not show any significant difference in our study.

**DISCUSSION**

In pregnancy, humoral immunity is said to be intact, but cell mediated immunity is markedly depressed, upregulation of innate immunity has been theorized to be a compensatory mechanism.<sup>2,3</sup> A major change in innate immunity noted is an increase in WBC count mainly due to neutrophilia.<sup>3,4,5,6,7,8</sup>

Our study shows increase in total WBC count in pregnant women as compared to the control group.

The increase in total WBC count in pregnant women is result of body building the immunity of the fetus and it is achieved by a state of selective immune tolerance, immunosuppression and immunomodulation in the presence of a strong antimicrobial immunity. There is also down regulation of potentially dangerous T – cell mediated immune responses, while activating certain components of the innate immune system, such as neutrophils.

Our study shows increase in WBC count with increase in gestational age and also after delivery.

There is also increase in neutrophil count and lymphocyte count with increase in gestational age and after delivery.

The mean value of WBC count, neutrophil, lymphocyte and monocyte was more in caesarean delivered patients as compared to normal vaginal delivered patients.

There is an absolute monocytosis during pregnancy especially in the first trimester but it decreases with advance in gestation. Monocytes help in preventing fetal allograft by infiltrating the decidual tissue (7<sup>th</sup>-20<sup>th</sup> week of gestation) possibly ,through PGE2 mediated immunosuppression.<sup>2</sup> Our study also shows significant changes in monocyte count.

Our study does not show any significant changes in Eosinophil and Basophil count.

In spite of the fact that the WBC is increased in normal pregnancy, higher counts may be an indicator of hematological malignancies.

These may occur rarely (1:75,000-100,000) in pregnancy and may pose a problem for managing obstetrician.<sup>9</sup> However , leukocytosis should be interpreted with caution and further tests should be requested to confirm the diagnosis of any systemic and local infection or other condition in pregnant women.

**CONCLUSION**

There was a significant increase in total WBC count, neutrophil count, lymphocyte and monocyte count in pregnant women with increasing gestational age and after delivery. Eosinophil and Basophils do not show any significant changes in pregnancy.

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