ORIGINAL RESEARCH PAPER

Physiology

A comparative study on haematological parameters amongst the women in advanced pregnancy and non pregnant women, in Barpeta town area, Assam.

KEY WORDS: Pregnancy, hematological Parameters, PCV, MCV. MCH, MCHC

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ABSTRACT

Introduction- Alteration of different haematological parameters is a physiological phenomenon during pregnancy as a result of hemodilution and other adjustments of the body homeostasis for providing adequate fetometanal environment. **Objectives-** To evaluate the changes in haematological parameter in pregnant women belonging to Barpeta town in comparison to non pregnant women. **Materials and methods-**. The hemoglobin(Hb) level, packed cell volume(PCV),mean corpuscular volume(MCV), mean corpuscular hemoglobin(MCH) ,mean corpuscular hemoglobin concentration(MCHC) total leucocytes count and platelet count were measured data were analyzed statistically. **Results & Observations-** Hemoglobin level, RBC count, PCV,MCV,MCH,MCHC and platelet count showed significant difference between the two groups with higher values in nonpregnant women and lower in the pregnant group. The mean total leucocytes was higher in pregnant group and lower in control group. **Conclusion-**Normocytic normochromic type of anaemia is observed among the pregnant women along with leucocytosis and thrombocytopenia.

Introduction

Though pregnancy is a very much physiological condition, it is capable of causing remarkable and dramatic changes in the hematological variables of the women. The haematological indices of an individual to a large extent reflect their general health [1] A pregnancy is influenced by many factors, some of which include culture, environment, socioeconomic status, and access to medical care. The haematological indices also have an impact on pregnancy and its outcome[2].   The most common haematological indices are the indicators of hemoglobin concentration. Low hemoglobin in the blood is widely identified as a hematological abnormality and it associated with adverse pregnancy outcome[3] Physiologic anaemia is the term often used to describe the fall in hemoglobin concentration that occurs during normal pregnancy results from increasing plasma volume above normal by the end of gestation although the red cell masses itself increase by some and still leads to a fall in hemoglobin concentration with a feature of normocytic and normochromic type of anaemia[4] Anaemia in pregnant women is variously defined with two common parameters either as hemoglobin concentration less than 11.0 gm/dl or 5th percentile of the distributions of hemoglobin concentration or haemotocrit in a healthy reference population in third trimester[5] Anaemia contributes to intrauterine growth restriction, preterm labour, abortions and it is also a primary cause of low immunity of both the mother and the baby, which makes them prone for several life threatening infections. [6]

This study is of importance because the systems monitored during the antenatal care in an attempt to predict and or improve pregnancy outcome are dependent on the quality and quantity of hematological indices. The current study focuses on the diagnostic evaluation of various conditions, specially role of hemoglobin concentration, total RBC count,PCV, MCV,MCH,MCHC and platelet count , which are some major hematological indices, that can vary during pregnancy. The current study aimed to determine the effect of pregnancy on those hematological parameters and to compare these parameters with healthy nonpregnant control population. The result can be used as a reference value in the assessment of the health status of pregnant women in this geographical study area.

Material and methods

This cross sectional study was undertaken in Fakhruddin Ali Ahmed Medical College, Barpeta, Assam. 60 otherwise healthy pregnant women in third trimester were taken as cases and another 60 non pregnant healthy women of 18 to 32 years were taken as control group after taking proper consent. All the study subjects included in the study were not suffering from any infectious disease at the time of examination. The first group which served as the test group presented themselves at the obstetrics and gynecology OPD of the institute for antenatal care. The second group which served as control comprised 60 nonpregnant women randomly selected from the student population in Fakhruddin Ali Ahmed Medical College, Barpeta. The study proposal was approved by the institutional ethics committee. The numbered and labeled questionnaire was, however, filled and returned immediately. The research questionnaire for the study was designed to suit the study. It comprised two sections of demographic/personal variables and information relating to their pregnancy/medical history which helped the researchers to exclude the subjects who are having any medical problems that may deviate the findings towards abnormal side. With the help of the nurses on duty 150, (75 from each group subject and control) blood samples were collected intravenously using standard procedures. Following the analysis of the questionnaire presented by the research participants in the test group, 60 persons met the minimum requirement in the test group which disqualified smokers and participants who had had a series of pregnancy complication and heavy alcohol consumption. From the control group samples 60 samples were accepted for further analysis. At the end of the sorting, blood samples was immediately taken to the automated haematological analyzer and the various results for the haematological indices were recorded. Results obtained from the haematological screening and questionnaire were analyzed using the data tool pack of Microsoft Excel 2007 and student's T test was done to compare the findings between the two groups.

Results and observation

We observed that all the participants of both the groups were between the age of 19 to 24 years. Among the participants 26% were educated up to tertiary level and 38% up to secondary level and remaining 36% up to primary level. All the participants were belonging to rural area.

Tab 1- Comparison of Mean and standard deviation of different haematological parameters between both groups of participants.

Parameters	Pregnant women(mean , SD)	Nonpregnant women(control)(mean, SD)	T value	P value	significance at P<.05
Hemoglobin (gm/dl)	9.20±1.55	10.95±1.55	-7.3065	<.00001	significant
RBC count (million/ dl)	3.78±0.55	4.47±0.319	-8.17	<.00001	significant
PCV(%)	31.015±2.84	33.01±2.84	-4.641	<.00001	significant
MCV(⬚m3)	79.67±6.03	95.97±12.60	-8.95	<.00001	significant
MCH(pg)	27.49±2.74	31.87±4.32	-6.57	<.00001	significant
MCHC(%)	30.50±2.36	32.4±5.60	-2.566	.005751	significant
Platelet count(lakh/dl)	1.86±0.72	1.99±2.05	-0.463	0.322	Not significant
Total WBC count(thousand/dl)	9.90±2.68	8.48±1.46	3.58	.000247	significant

Table-1 shows the comparison of the haematological parameters of the two groups in terms of mean and standard deviation. It was observed that haematological parameters in terms of hemoglobin level, RBC count, PCV, MCV, MCH and MCHC showed a significant decrease amongst the women with advanced pregnancy, in comparison to nonpregnant control group. This correlates with findings of other studies [3,4,5]. In the current study it was observed that the total leucocytes count was significantly higher in pregnant group as compared to that of control group, which is in consistent with the findings of Pitkin RM[7] and Witte DL and Osonuga et al[8]. Regarding platelet count there was no statistically significant difference observed between the two groups though there appeared a decrease level of platelet count amongst the pregnant women. The observation of significant variations in platelets count has also been observed in previous studies by Wahed et al[5]

Discussion

It was observed in the current study that mean hemoglobin level in the pregnant women is 9.20± 1.55gm/dl , which is significantly lesser than the mean hemoglobin level of non pregnant group(10.95±1.55gm/dl), indicating prevalence of anaemia amongst the pregnant women. RBC count was certainly below the normal range in the pregnant group, which contributes to the lower values of the haemotocrit level and other absolute blood indices. From the result presented in Table 1, it was observed that there was a significant difference in the PCV of the test group when compared to the control. The decrease in PCV may be due to increase in plasma volume during pregnancy which causes haemodilution, and increased rate of infection especially malaria, hormonal changes, and conditions that promote fluid retention and iron deficiency. This decrease PCV is consisting with findings of some other previous studies [4,6,9] MCV is within normal range showing normocytic anaemia, though there is a significant difference from the non pregnant control group mean MCV value. Similarly the mean MCH and MCHC level were within normal range in both the groups , still there were significant differences between the two groups , the pregnant group being at lower side. So, by analyzing the data of the haematolgical indices, hemoglobin level and RBC count we can type the anaemia of pregnant women under normocytic normochromic group. Maternal plasma volume increases by around 50% above the non-pregnant value by the late second trimester. Red cell mass only increases by 25–30%, resulting in a fall in Hb concentration ('physiological anaemia of pregnancy').   In our study the leucocytes count was significantly higher compared to that of control. This may be a result of the body building the immunity of the fetus and it is achieved by a state of selective immunot olerance, immunosuppression and immunomodulation in the presence of strong antimicrobial immunity[10]The mean Platelet

count was found to be decrease in the current study, but not significant statistically. Up to 10% of healthy pregnant women have a count below the non-pregnant reference range of 150–400×10^9/L at term ('gestational thrombocytopenia'

Conclusion

Anaemia during pregnancy is common and has both maternal and foetal consequences [11s] The most common cause is iron deficiency anaemia, other causes include infection, folate, and vitamin B12 deficiency [11]. About 95% of anemia cases during pregnancy are due to iron deficiency .Typically, PCV is ⬚30%, and MCV is < 79 fL. Decreased serum iron and ferritin and increased serum transferrin levels confirm the diagnosis [12]. It can be concluded that pregnancy in women alters haematological indices such as PCV, hemoglobin, leucocytes, and platelet counts along with other physical and chemical changes. Though this is said to be physiological, it is very much important to monitor these parameters during antenatal care to ensure healthy outcome and to rule out associated pathological condition and ensure early management if any.

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