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COMPLETE BLOOD COUNT FOR PREGNANT LADIES IN THE SECOND AND THIRD TRIMESTER IN NORTH KURDUFAN STATE, OBAIED, 2016

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ABSTRACT
Background: Complete blood counts are done to monitor overall health, to screen for some diseases, to confirm a diagnosis of some medical conditions, to monitor a medical condition, and to monitor changes in the body caused by medical treatments. Pregnancy is typically divided into three trimesters. **Objective**: The purpose of this study was to assess the changes of hematological parameters in second and third trimester pregnant Sudanese women. **Materials and Methods:** One hundred and fifty samples included in this study, 100 were pregnant women in second and third trimester and other 50 as a control group were evaluated to determine the changes in hematological parameters among pregnant women. Complete blood count measured using Sysmex ® Kx21-N hematological analyzer. **Results:** HB, RBCs, HCT and platelets were significantly decreased in second trimester pregnant women compared with control *P*-values (<0.000, <0.000, 0.000 and 0.05) for HB, RBCs, HCT and platelets respectively. MCH and MCHC were significantly decreased in second trimester pregnant women compared with third trimester *P*-values (<0.04, and <0.03) for MCH and MCHC respectively. There was no significant difference between others parameters. **Conclusion:** MCH and MCHC were significantly decreased in second trimester pregnant women compared with third trimester. There was no significant difference between others parameters.

KEYWORDS: Sudanese, Pregnancy, Second trimester, Third trimester,CBC

INTRODUCTION
Blood counts of various types have been used for clinical purposes since the 19th century. Automated equipment to carry out complete blood counts was developed in the 1950s and 1960s.[1] Complete blood counts are done to monitor overall health, to screen for some diseases, to confirm a diagnosis of some medical conditions, to monitor a medical condition and to monitor changes in the body caused by medical treatments.[2]

For patients who need blood transfusion, a blood count may be used to get data which would help plan an amount of treatment. [3]In such cases, the person should have only one blood count for the day, and the transfusion of red blood cells or platelets should be planned based on that.[3] Multiple blood draws and counts throughout the day are an excessive use of phlebotomy and can lead to unnecessary additional transfusions, and the extra unnecessary treatment would be outside of medical guidelines. [3] Most blood counts today include a CBC count and leukocyte differential count (LDC) (that is, not just the total WBC count but also the count of each WBC type, such as neutrophils, eosinophils, basophils, monocytes, and lymphocytes). More sophisticated modern analyzers can provide extended differential counts, which include hematopoietic progenitor cells, immature granulocytes and erythroblasts.[4]

Pregnancy is typically divided into three trimesters. The first trimester is from week one through 12 and includes conception. Conception is when the sperm fertilizes the egg. The fertilized egg then travels down the fallopian tube and attaches to the inside of the uterus, where it begins to form the fetus and placenta. The first trimester carries the highest risk of miscarriage (natural death of embryo or fetus). The second trimester is from week 13 through 28. Around the middle of the second trimester, movement of the fetus may be felt. At 28 weeks, more than 90% of babies can survive outside of the uterus if provided high-quality medical care. The third trimester is from 29 weeks through 40 weeks.[5]

Pregnancy is associated with several changes in complete blood count arising from increased consumption in the uteroplacental circulation and haemodilution.

MATERIALS AND METHODS

This study is a case-control study, conducted in North Kurdufan State, Obaied, 2016, Sudan, in the period from September 2016 January 2017. 150 samples included in this study, 100 were pregnant women in second and third trimester and other 50 healthy women as the same age of patient group as a control group were evaluated to determine the changes in hematological parameters among pregnant women.

Blood samples were collected from all subjects in EDTA containers for measurement of complete blood count using Sysmex ® Kx21-N hematological analyzer. The control group consisted of healthy volunteers without a medical history of diseases. This study was approved by ethical committee of ministry of health, and informed consent was obtained from each participant before sample collection.

Haematological assay

Hematological parameters were counted using the direct current detection method with coincidence correction. Automatic discriminators separate the cell populations based on complex algorithms. The intensity of the electronic pulse from each analyzed cell is proportional to the cell volume. Even with samples at extremely low or unusually high concentrations, the Sysmex cell counters analyze cells with uncompromised precision and accuracy.

RESULTS

Demographic, clinical and characteristics of study participants

In total of Hundred patients of suddenness pregnant women (divided into two groups, fifty subjected were second trimester and fifty subjected were third) were investigated for full blood count. Moreover, fifty female subjected to the same investigations to serve as control. (Table 1, 2 .3 and 4)

Table (3 and 4) shows mean age of control of 25.8±5.2 years ranging (19-36 years) and mean age second trimester of pregnant women was 24.9±5.2years ranging (17-3 years), while mean age of pregnant women in third trimester was 26.4±4.1 years ranging (18- 35 years) no significant difference between ages of the three participants.

Table 1: Number of pregnant woman and control group

Participants	Frequency	Percent
Control (non pregnant)	50	33.3
Pregnant	100	66.7
Total	150	100

Table 2: Mean ages (years) of groups enrolled in the study.

Participants	Minimum	Maximum	Mean ±SD
Control	19	36	25.8±5.2
Second trimester	17	37	24.9±5.2
Third trimester	18	35	26.4±4.1

Table 3: Mean ages (years) of control and Second trimester enrolled in the study.

Participants	Minimum	Maximum	Mean ±SD	p.value
Control	19	36	25.8±5.2	0.889
Second trimester	17	37	24.9±5.2	

Table 4: Mean ages (years) of control and Third trimester enrolled in the study.

Participants	Minimum	Maximum	Mean ±SD	p.value
Control	19	36	25.8±5.2	0.53
third trimester	18	35	26.4±4.1	

Comparison of Hematological parameters of the studyparticipants

Table 5: Mean value of CBC parameters in control and pregnant women

Variables	Control non pregnant n=50	Cases Pregnant n=100	*P*-value
HB (g/dl)	12.8±0.64	11.5±0.69	0.000
TWBCs (X $10^{3)}$	6.2±1.6	7.4±2.1	0.01
RBCs ($X10^{6)}$	4.6±.33	4.1±.45	0.000
HCT %	38.2±1.9	35.3±3.1	0.000
MCV (fl)	84.3±4.4	83.9±10.9	0.840
MCH (pg)	28.1±2.6	28.5±6.7	0.860
MCHC (g/dl)	33.0±1.7	32.5±2.2	0.190
Platelets ($X10^3$)	285±65.4	246±83.4	0.04
RDW %	13.4±0.41	15.1±2.9	0.000
Neutrophils %	59±8.8	64±12.6	0.01
Lymphocytes %	33 ±8.3	29 ±11.3	0.02
MXD %	8.3±1.6	8.1±5.7	0.870

Table 5: represents the findings of CBC parameters in control and pregnant women (cases) .HB, RBCs, HCT and platelets were significantly decreased in pregnant women (cases) compared with control *P*-values (<0.000, <0.000,

0.000 and 0.04) for HB, RBCs, HCT and platelets respectively. TWBCs and RDW on the other hand was significantly increased at *P*-value (<0.01 and 0.000). Also show Mean values Neutrophils and lymphocytes were increased *P*-values 0.01, 0.02, for neutrophils and lymphocytes respectively. MCV. MCH and MCHC remain within normal values and no significant alteration was occurred. *P*-values =0.840, 0.860 and 0.190 respectively

Table 6: Mean value of CBC parameters in control and pregnant women in second trimester

Variables	control n=50	Second trimester n=50	*P*-value
HB (g/dl)	12.8±0.64	11.5±1.1	0.000
TWBCs (X $10^{3)}$	6.2±1.6	7.4±2.1	0.05
RBCs (X$10^{6)}$	4.6±.33	4.0±.47	0.000
HCT %	38.2±1.9	34.8±3.4	0.000
MCV (fl)	84.3±4.4	83.3±14.2	0.760
MCH (pg)	28.1±2.6	29.8±8.9	0.05
MCHC (g/dl)	33.0±1.7	33.2±2.0	0.620
Platelets (X10^{3})	285±65.4	242±82.0	0.02
RDW %	13.4±0.41	15.6±3.6	0.000
Neutrophils %	59±8.8	64±10.5	0.03
Lymphocytes %	33 ±8.3	28±8.6	0.09
MXD %	8.3±1.6	8.6±7.7	0.11

Table 6 : represents the findings of CBC parameters in control and pregnant women in second trimester .HB, RBCs, HCT and platelets were significantly decreased in second trimester pregnant women compared with control *P*-values (<0.000, <0.000, 0.000 and 0.02) for HB, RBCs, HCT and platelets respectively. TWBCs , MCH and RDW on the other hand was significantly increased at *P*-value (<0.01, 0.05 and 0.000). Also show Mean values Neutrophils and lymphocytes were increased *P*-values 0.03, 0.09, for neutrophils and lymphocytes respectively. MCV, MCHC and MXD remain within normal values and no significant alteration was occurred. *P*-values =0.8760, 0.620 and 0.11 respectively.

Table 7: Mean value of CBC parameters in control and pregnant women in third trimester

Variables	Control n=50	third trimester n=50	*P*-value
HB (g/dl)	11.5±1.1	11.5±78	0.000
TWBCs (X $10^{3)}$	7.4±2.1	7.3±2.1	0.01
RBCs (X$10^{6)}$	4.0±.47	4.2±.43	0.000
HCT %	34.8±3.4	35.7±2.6	0.000
MCV (fl)	83.3±14.2	84.5±6.1	0.650
MCH (pg)	29.8±8.9	27.1±2.5	0.170
MCHC (g/dl)	31.8±2.2	31.8±2.2	0.620
Platelets (X10^{3})	242±82.0	250±85.0	0.05
RDW %	15.6±3.6	14.7±1.9	0.000
Neutrophils %	64±10.5	64±14.6	0.01
Lymphocytes %	28±8.6	29±13.5	0.009
MXD %	8.3±1.6	7.6±2.3	0.730

Table 7: represents the findings of CBC parameters in control and pregnant women in third trimester. HB, RBCs, HCT and platelets were significantly decreased in second trimester pregnant women compared with control *P*-values (<0.000, <0.000, 0.000 and 0.05) for HB, RBCs, HCT and platelets respectively. TWBCs, and RDW on the other hand was significantly increased at *P*-value (<0.01, and 0.000). Also show Mean values Neutrophils and lymphocytes were increased *P*-values 0.01, 0.009, for neutrophils and lymphocytes respectively. MCV, MCH MCHC and MXD were no significant alteration was occurred. *P*-values =0.650, 0.170. 620 and 0.730 respectively.

Table 8: Mean value of CBC parameters in Second trimester and second trimester in pregnant women

Variables	Second trimester n=50	Third trimester n=50	*P*-value
HB (g/dl)	11.5±1.1	11.5±78	0.869
TWBCs (X $10^{3)}$	7.4±2.1	7.3±2.1	0.688
RBCs (cells X$10^{6)}$	4.0±0.47	4.2±0.43	0.09
HCT %	34.8±3.4	35.7±2.6	0.130
MCV (fl)	83.3±14.2	84.5±6.1	0.620
MCH (pg)	29.8±8.9	27.1±2.5	0.04
MCHC (g/dl)	33.2±2.0	31.8±2.2	0.003
Platelets (X10^{3})	242±82.0	250±85.0	0.651

RDW %	15.6±3.6	14.7±1.9	0.153
Neutrophils %	64±10.5	64±14.6	0.934
Lymphocytes %	28±8.6	29±13.5	0.735
MXD %	8.6±7.7	7.6±2.3	0.380

Table 8: Show compression of CBC parameters between second and third trimester. MCH and MCHC were significantly decreased in second trimester pregnant women compared with third trimester *P*-values (<0.04, and <0.03) for MCH and MCHC respectively. There was no significant difference between others parameters.

DISCUSSION

The aim of the study was to determine the mean values for hematological indices in pregnancy and the second and third trimester mean values for hematological indices in pregnant women. We found that HB, RBCs, HCT and platelets were significantly decreased in second trimester pregnant women compared with control *P*-values (<0.000, <0.000, 0.000 and 0.02) for HB, RBCs, HCT and platelets respectively. These findings agree with those of a similar study undertaken in Ibadan, south-western Nigeria, by Akingbola et al in 2006,[6] which reported exactly the same pattern. The progressive decline in HB, RBCs, and HCT concentrations from the first to third trimester may be due to an increased demand for iron as pregnancy progresses. According to physiological hemodilution associated with pregnancy, which also contributes to the drop in PCV in the second trimester, in late pregnancy, plasma volume increases at a slower rate, inducing a slight rise in hematocrit that may account for the slight rise in PCV in the third trimester.[7]

After anemia, thrombocytopenia is the second most common hematologic abnormality that occurs during pregnancy.[8] Our study reported a gradual reduction in PLT count as pregnancy advanced, which is also agrees with Akingbola et al's study.[9] Due to hemodilution secondary to expansion of plasma volume, the PLT count in normal pregnancies may decrease by approximately 10%, with most of this decrease occurring during the different trimesters, although the absolute PLT count tends to remain within the normal reference range in most patients.

A limitation of this study was the lack of a control group of unsupplemented women. However, such a group may not have gained ethical approval, considering the high prevalence of anemia in Sudan environment. Another important limitation of this study may have been the reliability of the information provided by participants and data extracted from clinical notes.

CONCLUSION

MCH and MCHC were significantly decreased in second trimester pregnant women compared with third trimester. There was no significant difference between others parameters.

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