Iron Profile among Pregnant Women in Wad Medani Obstetrics and Gynaecology Teaching Hospital, Gezira State, Sudan (2020)

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Abstract:

Background: During pregnancy, iron needs increase substantially to meet its requirements for supporting fetoplacental development and maternal adaptation to pregnancy. The aim of this study is to assess the iron profile and hemoglobin during pregnancy in Wad Medani Obstetrics and Gynecology teaching hospital, Gezira state, Sudan. **Materials and Methods** A cross-sectional study conducted in pregnant women in different trimesters in the period from 10 to23/ 2021. Ninety eight pregnant women (aged 18 - 43 years) attended to the obstetrics and gynecology department during the study period, were recruited in the study. The study protocol was approved by the Ethics committee of Faculty of Medicine University of Gezira.The Statistical Package for Social Science (SPSS software, version 16.0) was used for data statistical analysis. ANOVA and t-test tools were employed for comparison of means for different variables and circumstances. The P value of ≤ 0.05 was considered statistically significant. In this study, five ml of blood samples taken from the vein for each patient and divided into two containers EDTA tube to measure hemoglobin on a fully automated hematology analyzer and Lithium Heparin Gel tubes for iron profile. **Results:** The mean values of Hb, and transferrin were found to be lower in 3rd trimester as compared to 1st trimester .Whereas, Serum iron and Serum TIBC levels increased during 1st, 2nd and 3rd trimesters. **Conclusion:** On the bases of the Results obtained in this study we concluded that; there is no changes in iron profile and Hb of pregnant women during different trimesters except that in values of TIBC are frequently abnormal in pregnancy. In this study, we recommend that pregnant women should take iron supplements.

Keywords: Pregnant Women, Iron profile, Gezira State, Sudan.

1-Introduction:

Iron is one of the most important micronutrients for human populations, given its central role in key biological processes. Iron is especially critical period during pregnancy given the rapid cell and tissue development involved in fetal growth. Pregnancy has a net iron cost in the range of 600- 800mg (1) (2). It has been reported that 56% of pregnant women in low income countries are affected in contrast to 18% in high income countries. In pregnant women, an adequate iron status is important to ensure an uncomplicated pregnancy as well as a normal development of the fetus and maturity of the newborn child (3). Iron deficiency during pregnancy is associated with a number of maternal and fetal problems including the risks of preterm births, low birth weight babies, perinatal mortality and intrauterine growth retardation (4). The hemoglobin concentration is often used as a pseudo marker for iron deficiency. However, hemoglobin is not suitable to asses' iron-status especially not in pregnancy due to hypervolemia and hem dilution. Hemoglobin yields information about the presence of anemia in general when body iron reserves are depleted (5). The diagnostic workup for iron deficiency includes red blood cell indices, serum iron, and serum total binding capacity, serum transferrin saturation and serum ferritin level. Serum iron transferrin is frequently abnormal in pregnancy. Low sensitivity of transferrin saturation and day to day and even hour to hour fluctuation of serum iron levels renders it less efficient than serum ferritin level for diagnosing iron deficiency which is the only condition associated with decreased serum ferritin concentration (6) (7). Serum ferritin, a marker of iron

storage, has the advantage of being a sensitive indicator of iron deficiency, but because it is increased in the presence of inflammation, ferritin is not a specific indicator of iron deficiency (8) (9).
Approximately 800 mg of iron are requirement in pregnancy, over and above the 230 mg of iron that the women would have required even if she had not been pregnant, and the 150mg that she may lose through blood loss at delivery (10) (11).
Iron deficiency is the most prevalent global nutrient deficiency and the most common cause of anemia worldwide (12). Iron deficiency represents a spectrum ranging from iron depletion without anemia (reduced iron stores with a normal hemoglobin (Hb) concentration) to eventual overt anemia, where the iron supply is insufficient to maintain a normal Hb concentration (13). Pregnant women are particularly vulnerable to iron deficiency due to substantial increase of iron requirement during pregnancy to support the expansion of erythrocyte mass and plasma volume, and fetal-placental growth (12). The World Health Organization WHO estimates that at least 30–40% of pregnant women are iron deficient and that nearly half are anemic . For pregnancy, the European Food Safety Authority (EFSA) and the UK Committee on Medical Aspects of Food Policy recommend no increase in iron intake over that for non-pregnant women. The extra iron requirements during pregnancy are considered to be met through cessation of menstrual losses, increased intestinal absorption and mobilization of maternal iron stores. However, a large proportion of pre-pregnant women or those of reproductive age have low iron stores. Predisposing them to an increased risk of iron deficiency when becoming pregnant.
hemoglobin is the protein molecule in red blood cells that carries oxygen from the lungs to the body's tissues and returns carbon dioxide from the tissues back to the lungs (14) (15).

1.1 iron:

Iron is important in pregnancy, so how she can eat enough iron to support her growing baby. Iron is used by the body to make red blood cells. Your body makes more blood when you are pregnant because you and your baby are growing. This means you need more iron when you are pregnant. Having low iron levels can make you feel tired, have poor concentration and increase your risk of infection. Very low iron levels can affect your baby's growth and can increase the risk of your baby coming early (14) (15).(

1.2 Justification:

The prevalence of iron deficiency anaemia is (55.8%) during pregnancy in developing country. Pregnant women have to assess iron status to prevent medical complications and reducing mortality and morbidity. Also the iron profile test facilitates the monitoring and evaluation of progress towards international goals of preventing and controlling iron deficiency during Pregnancy.

1.3 Objectives:

To assess Iron Profile among Pregnancy in Wad Medani Obstetrics and Gynaecology Hospital, Gezira State, Sudan

2. Material and Methods

2-1 Study Subjects, area and design

2-2 Study area

Wad Medani Obstetrics and Gynecology teaching hospital, Gezira state, Sudan

2.3-Study design

This is - cross-sectional study conducted in pregnant women in different trimesters.

2. 4-Study subjects

Ninety eight pregnant women attend to the hospital for the prenatal visits in Wad medani teaching hospital

2.5-Inclusion criteria

Pregnant women who are attending for the antenatal care in wad Medani Obstetrics and Gynecology teaching hospital

2.6-Exclusion criteria

Pregnant women have chronic diseases (cardiovascular disease –cancer –diabetes – hypertension -etc.)

2.7 Ethical consideration

The study protocol were approved by the Ethics committee of Faculty of Medicine University of Gezira

2-8 Questionnaires

Information about age, socioeconomic status, demographic data, number of pregnancy, residency, occupation education and level iron-supplement are obtain by patient interview.

2.9-Blood samples

Five ml of blood samples taken from the vein for each patient and divided into two containers purple top was EDTA tube to measure Hb on a fully automated hematology analyzer systmex KX-21and Green top Lithium Heparin Gel tubes for serum to iron profile test. The serum was separated by centrifugation at 1000 rpm for 2 minutes Transferrin was estimated indirectly from the TIBC value by the following equation:

Transferrin % = S. Iron µg/L ×100 %/ TIBC (µg/L). (16)

2. 10 Instruments

Equipment and instrument used in this study include: Automatic Pipettes, Centrifuge, test tubes, racks, syringes, and cotton..

2. 11 Methods:

Measurement of iron profile by the Roche Diagnostic cobas C311 analyzer is automated, software-controlled analyzer for clinical chemistry analysis. It is designed for both quantitative and qualitative in vitro determinations using a large variety of tests for analysis. The cobas C311 analyzer performs photometric assays and ion-selective electrode measurements and uses serum/plasma. (COBAS c311 User Manual, 2019)

2.12 Data analysis

The data analyzed using statistical package for social science IBM SPSS statistic version 16. The independent –samples, t-test was used to compare the means of the cases. The results presented as mean ± SD and P. value ≤0.05 considered significant.

3-Result

Ninety eight women were enrolled in this study, mean age of pregnant women was 27.4 ±0.5 Table (1)

The majority of the participating pregnant women were house wife's 96% n=96. Women were divided in to three group according to gestational period as follows first trimester (31.6%, n=31/98), second trimester (33.7%, n=33/98), third trimester (34.7%, n =34), number of pregnant women living in rural area (73.4%, n=72/98), while number of pregnant women living in urban area (26, 5%, n=26). Table (2)

Hemoglobin level, S. Iron, Transferrin, and TIBC are shown in Table (3-3) the table shows the values (mean ±SD) in different trimesters.

Table 1: Distribution of study group according to age and level of gestation (mean± SD)

Age/year (mean± SD)	Trimesters	Number
28.03 ±5.78	1st trimester	31
27.29±5.765	2nd trimester	33
27.29±5.41	3rd trimester	34
Total group 27.40±5.62	(98/98,100%)	98

Table 3-2: Residency, educational level and occupation of pregnant women

Level of gestation		1st trimester	2ndtrimester	3rd trimester	Total
No.		31	33	34	98
Residency	Rural	24	22	26	72
	Urban	7	11	8	26
educational level	illiterate	3	6	7	16
	primary	8	14	8	30
	secondary	10	6	9	25
	university	10	7	10	27
Occupation	House wife	30	33	33	96
	teacher	1	0	1	2

Table 3-3: shows the Haemoglobin and Iron profile in 98 pregnant women in different trimesters.

Table3-3 :(mean±SD) of Hb and iron profile in study groups during different trimesters

Variable	1st trimester	2ndtrimester	3rd trimester
Hb g/dl	12.3±1.32	11.6±1.19	11.9±2.05
S. Iron µg/L	70.2±21.26	73.6±39.11	78.3±39.13
Transferrin %	42.7±91.76	31.6±52.41	22.8±9.60
TIBC µg/ι	324.9±104.52	366.9± 80.98	380.0±78.56

Table 3-4 shows the comparison between Haemoglobin and Iron profile in different trimester

Table3-4: comparison of Hb and iron profile of study groups during different trimesters

Variable	1st trimester	2ndtrimester	3rd trimester	P.value
Hb g/dl	12.3±1.32	11.6±1.19	11.9±2.05	0.175
S. Iron µg/L	70.2±21.26	73.6±39.11	78.3±39.13	0.656
Transferrin%	42.7±91.76	31.6±52.41	22.8±9.60	0.442
TIBC µg/ι	324.9±104.52	366.9± 80.98	380.0±78.56	0.044

Table 3-5 shows that the Correlations between Haemoglobin and Iron profile

Table 3-5: Correlations of Hb with iron profile in the study subjects

	Hb (g/dl)	
	r.value	P.value
Hb (g/dl)	-	-
S. Iron µg/L	0.06	0.582 Not sig
Transferin%	0.05	0.620 Not sig
TIBC µg/L	0.08	0.411 Not sig

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4-Discussion

The present study was conducted on pregnant women attending for regular prenatal care in Wad Medani Obstetrics and Gynaecology Teaching Hospital. The Hb and iron profile in the first, second, and third trimesters of the pregnant women were measured, there were marked changes in the Hb profile during pregnancy, several factors were observed to be responsible for a high rate of iron deficiency in a community like ours. Multi parity, poor socio economic and educational status are the principal reasons for a high prevalence of iron deficiency anemia in our population. In this study there was statistically significant differences were observed in TIBC in the first, second, and third trimesters of pregnancy. Highest values being observed among subjects in the first trimester and lowest values among subjects of the third trimesters of pregnancy (P≤ 0.05) .Our study agreed with (17), who had concluded that TIBC are frequently abnormal in pregnancy and no statistically significant difference in the average hemoglobin and S. iron and Transferrin in different trimesters of pregnancy This study agreed with (18), and (19).

Hb and iron profile samples were analyzed and the results outcome showed that the mean of Hb in the first, second, and third trimesters were 12.3, 11.6, and 11.9 respectively, and the range was 11.6–13.9, 9.7–14.8, 9.5–15.0 respectively, this result is considered within the international normal range according to the Principles of Internal Medicine (20). who found that the Hb level of pregnant women was in the normal range in the first, second, and third trimesters were 10.81, 10.62, and 10.83 respectively. Nigeria who found that the mean of Hb was in normal range in different trimesters. In our study we found that the mean of iron profile in the first, second, and third trimesters was S.iron 70.2 , 73.6 and 78.3 respectively and the range was 72–143, 44–178 ,and 30–193respectively this result is considered within the international normal range according to the Principles of Internal Medicine (20) and Transferrin was 42.7, 31.6 and 22.8 in the first, second, and third trimesters respectively also considered within the international normal range 13-45 ,10–44, and 5–37. Our study agree with the study done by (21**),** in Sulaimania City in Iraq who found that the mean of S.iron in the first, second, and third trimesters were 60.93 , 51.97 and 50.99 respectively, and Transferrin in the first, second, and third trimesters were 17.02 ,14.69 and 16.01 respectively .

According to the Principles of Internal Medicine, the mean of TIBC µg/L in the first, second, and third trimesters was 324.9, 366.9 and 380 respectively, with a range of 72–143, 44–178 and 30–193. This result is considered within the international normal range (20). Our findings are consistent with those of (22) in Pakistan who reported that the mean of TIBC µg/L was 325.81, 341.93, and 438.66 in the different trimesters while S.iron was 60.93, 51.97, and 50.99 in the different trimesters.

5. Conclusions:

On the bases of the Results obtained in this study we concluded that; there is no changes in iron profile and Hb of pregnant women during different trimesters except that in values of TIBC are frequently abnormal in pregnancy

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