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Determination of Anemia Subtypes among Pregnant Women in Shendi Town

A thesis submitted for partial fulfillment of the degree of M.Sc. in Medical Laboratory Sciences (Hematology)

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الآيـــــــة

بسم الله الرحمن الرحيم

قال تعالى :

﴿ لَقَدْ أَرْسَلْنَا رُسُلَنَا بِالْبَيِّنَاتِ وَأَنزَلْنَا مَعَهُمُ الْكِتَابَ وَالْمِيزَانَ لِيَقُومَ النَّاسُ بِالْقِسْطِ وَأَنزَلْنَا الْحَدِيدَ فِيهِ بَأْسٌ شَدِيدٌ وَمَنَافِعُ لِلنَّاسِ وَلِيَعْلَمَ اللَّهُ مَن يَنصُرُهُ وَرُسُلَهُ بِالْغَيْبِ إِنَّ اللَّهَ قَوِيٌّ عَزِيزٌ ﴾

سورة الحديد الآية (25)

Dedication

To those

Who give me the best of life without payment

To my father and mother for their patience and support

To my husband

To my brothers and sister

To my teachers

To all my friends

ACKNOWLEDGEMENT

First of all I thank the Almighty Allah who helped me to complete this study.

I would like to express endless thanks to my supervisor,

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List of abbreviation

Abbreviation	Term
CBC	Complete Blood Count
EPO	Erythropoietin
FBC	Full blood count
Hb	Hemoglobin
IDA	Iron deficiency anemia
MA	Megaloblastic anaemia
MCH	Mean cell hemoglobin
MCHC	Mean cell hemoglobin
MCV	Mean cell volume
MDSs	Myelodysplastic syndromes
PCV	Packed cell volume
RBCs	Red blood cell
RDW	Red Distribution Wight
WHO	World health organization

ملخص البحث

مقدمة: أجريت هذه الدراسة الوصفية القطعية التحليلية في مدينة شندي في الفترة ما بين شهر مارس إلى شهر أغسطس 2018م، وهدفت لتحديد انواع فقرالدم لدي النساء الحوامل في مدينه شندي.

المنهجية: شملت هذه الدراسة 75 امرأة حامل أعمارهن مابين (15– 45 سنة) منهن (50) مصابات بفقر الدم كعينة اختبار و(25) نساءحوامل غير مصابات بفقر الدم كعينة ضابطة. هذه الدراسة.

تم جمع 5مل من الدم الوريدى من وقسمت في حاويتان احداهما تحتوي علي مادة مضادة للتجلط لاجراء فحص الدم الكامل بواسطه جهاز التحليل الدموي الالى, وحاوية أخري لاتحتوي علي مضاد تجلط و ذلك لقياس مستوي الحديد في المصل.

النتائج: أوضحت نتائج الدراسة أن متوسط مستوي الهيموغلوبين عند النساء الحوامل المصابات بفقر الدم كان (9.6 جم/ دل) .وكذلك أظهرت الدراسة أن نسبة انتشار فقر الدم بينهم كانت (66.7%).

كذلك أوضحت الدراسة أن أكثر أنواع فقرالدم انتشارا من النوع صغير الكريات ناقص الصباغ وذلك بنسبة (60%).

Abstract

Background: About anemia the condition of having a lower than normal number of red blood cells or quantity of hemoglobin. This is descriptive analytical cross sectional study, was conducted in Shendi town during the period of March to August 2018, which aimed to determine the type of anemia among pregnant women.

Methodology: A total 75 pregnant women were included in this study with average age of (15- 45year), a (50) of them were anemic pregnant women as test group and (25) of them were non anemic pregnant women as control groups. Five ml of venous blood were collected from each pregnant women (2.5 ml into EDTA container to perform the complete blood count and 2.5 ml in plain container and then centrifuged to obtain serum to perform serum Iron. The complete blood count was performed by using hematology analyzer and S.

Result: The results of this study revealed that the mean of haemoglobin level in anaemic pregnant women was (9.6g/dl), also the study observed that the prevalence of anemia was (66.7%), and most of anaemia was mild to moderate anaemia.

Regarding to morphological classification of anaemia the results of this study revealed that microcytic hypochromic anaemia with frequency (60%), while normocytic normochromic was (40%).

Conclusion: The prevalence of anemia among study group was (66.7%) and the mean of Hb level was (9.6g/dl). A majority of anemia is Microcytic hypo chromic anemia.

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1.1 Introduction

Anemia is frequently observed nutritional disease recognized by abnormal screening laboratory tests where hemoglobin concentration < 11 g/dL & hematocrit < 33% are diagnostic values in pregnancy.

Classification of anemia to Mild anemia–Hemoglobin concentration 10– 10.9g/dL Moderate anemia-Hemoglobin concentration 7– 9.9gm% Severe anemia-Hemoglobin concentration < 7 g/dL [1].

Globally anemia affects around 32.4 million (38.2%) of pregnant women. It is a severe public health problem in South East Asia (48.7%) and Africa (46.3%[2] The effect of anemia during pregnancy include less exercise tolerability, puerperal infection,,postpartum hemorrhage, pregnancy induced hypertension, placenta praevia, cardiac failure, low birth weight, preterm delivery, and prenatal death[3,5]. Worldwide it has been reported that nearly 510,000 maternal deaths occur per year associated with childbirth or early post-partum.

Approximately 20% of maternal death is caused by anemia; the majority of this is taking place in developing countries [5]

In developing countries, pregnant women start pregnancy with already depleted body stores of iron and other vitamins. This is mainly due to poor nutritional intake, repeated infections, menstrual blood loss and frequent pregnancies. It is also associated with socioeconomic conditions, lifestyles, and health-seeking behaviors across different cultures [3,4] .

Despite the efforts made by the government and other stakeholders, anemia during pregnancy is still a public health problem in Sudan. There is a significant variation in the prevalence of anemia within and between regions. Even though many researchers have been Conducted using cross sectional study, their result revealed that determinants of anemia were Vary from place to place .[5,6]

1.2 Rational

Anemia is one of the most common disorders affecting human in the world, pregnant women are common group that suspected to have anemia and the pregnancy associated with marked physiological change in circulating blood, increase in blood volume. Women often become anemic during pregnancy because increased the demand of iron and other vitamins for requirement to develop of fetus , so this study was conducted to determine the types of anemia among pregnant women in Shendi Town.

1.3 Objectives

1.3.1: General objective:

Determination of anemia subtypes of anemia among pregnant women.

1.3.2: Specific objectives:

1. To assess the degree of anemia among pregnant women according to different trimesters.
2. To determine of Hb level in pregnant women according to age.
3. To measure serum iron in microcytic hypochromic anemia.
4. To evaluate the effect of Iron and Folic acid intake on Hb level.
5. To determine the Hb and RBCs indices among pregnant women with anaemia and comparing to normal pregnant women.

2. Literature review

2.1 Anemia:

2.1.1 Definition:

This is defined as a reduction in the hemoglobin concentration of the blood. Although normal values can vary between laboratories, typical values would be less than 13.5 g/dL in adult males and less than 11.5 g/dL in adult females. From the age of 2 years to puberty, less than 11.0 g/dL indicates anemia. As newborn infants have a high hemoglobin level, 14.0 g/dL is taken as the lower limit at birth. Reduction of hemoglobin is usually accompanied by a fall in red cell count and packed cell volume (PCV).[7]

Red cells are produced in the bone marrow (BM) from myeloidprogenitor cells, where their production requires a permissive Bmicro-environment and adequate substrate (including iron, vitaminB12 and folate) for Hb, protein and DNA synthesis. Erythropoiesis iscontrolled by erythropoietin (EPO), which is synthesised by peritubular fibroblasts in the renal cortex in response to reduced oxygen tension.

According to the World Health Organization (WHO), anaemia is defined as 'a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiologic needs'. It is the most common disorder globally and one of the conditions that general practitioners most frequently encounter. Anaemia is rarely an isolated disease and is most often a sign of an acquired or inherited disorder.[8]

According to the WHO global database[9], anaemia is estimated to affect 1.6 billion people. The highest prevalence is found in preschool-age children (47.4%), followed by pregnant females (41.8%), non-pregnant females (30.2%), school-age children (25.4%),and males (12.7%)[9].

When investigating patients with anaemia, two fundamental questions have to be considered: (*i*) What is the cause of the anaemia?; and (*ii*) What is the urgency for

correcting the anaemia, i.e. is a blood transfusion or other urgent intervention indicated?

2.1.2 Classification:

Anaemia may be classified as follows:

Based on red cell characteristics (red cell size, chromia and morphology):

• hypochromic microcytic.

• macrocytic normochromic.

• normochromic normocytic.

Morphology:

• leuco-erythroblastic.

• micro-/macroangiopathic.

Based on underlying mechanism:

• decreased BM production/output:

• BM aplasia/infiltrate

• ineffective haematopoiesis, e.g. megaloblastic anaemia (MA), myelodysplastic syndromes (MDSs), HIV.

• substrate deficiency.

• EPO insufficiency.

• peripheral loss/destruction:

• bleeding.

• sequestration.

• haemolysis.

2.1.3: Diagnostic approach to a patient withsuspected anaemia

As anaemia may manifest in a wide range of disorders ; The approach outlined here is based on the abovementioned classification, clinical scenario and full blood count (FBC) findings[10]

Patients generally present with symptoms of anaemia, i.e. increased tiredness/fatigue, dyspnoea and decreased effort tolerance. The severity of

symptoms depends on the degree of anaemia and rate of Hb decrease. Therefore, at a given Hb level, anaemia from acute blood loss is likely to manifest more severely than anaemia of insidious onset (weeks to months). Symptoms during early childhood should remind one of possible inherited forms of anaemia, e.g. thalassaemia.

2.1.4 History

A detailed history is of paramount importance and often eliminates much of the speculation during investigation. This should include:

• interrogation of the presenting complaint and duration of the problem.

• transfusion history.

• dietary history, including pica (craving for unusual food items, generally associated with iron deficiency).

• travel history (to endemic malarial or other infectious areas).

• change in bowel habits.

• bleeding (e.g. gastrointestinal and genito-urinary).

2.1.5 Clinical examination:

A wide range of signs and symptoms may be apparent. Systematic examination directs further investigation and may reveal the possible cause.

• Skin and mucous membrane:

• Pallor is the cardinal clinical sign for anaemia, which should be confirmed by measuring the Hb level.

• angular stomatitis.

• glossitis in nutritional deficiencies.

• koilonychia (spoon-shaped nails) in iron deficiency.

• premature greying, which often accompanies MA.

• scleral ictus, which indicates possible haemolysis or ineffective erythropoiesis.

• Neuromuscular:

• muscle weakness

• headache, lack of concentration, drowsiness, tinnitus.

• paraesthesias, peripheral neuropathy, ataxia and loss of vibration sense, and proprioception in pernicious anaemia.

• Cardiovascular:

• hyperdynamic circulation with haemic 'flow' murmurs

• cardiac failure.

• Clues for infection, malignancy (e.g. lymphoma,

leukaemia, metastatic carcinoma):

• hepatosplenomegaly

• lymphadenopathy

• bleeding manifestations (petechiae,

purpura, ecchymosis), BM failure.

2.1.6: Laboratory testing:

An FBC, differential and reticulocyte counts together with microscopic blood smear examination should be the starting point of investigations. These confirm the clinical suspicion of anaemia and direct further investigation. Local laboratory/population reference ranges that are age and gender specific should be used. The normal reference ranges for Hb in adults in the Witwatersrand area, Johannesburg, South Africa (SA) are as follows:

• Male: 13.8 - 17.9 g/dL (anaemia <13 g/dL).

• Female: 12.4 - 15.5 g/dL (anaemia <12 g/dL.

• Pregnancy <11 g/dL) [11] .

2.2 Pregnancy:

The pregnancy is important mechanism for life to continue. Pregnancy is the period from conception to birth, occur after the egg is fertilized by sperm and then implantation in the uterus. It develops into placenta and embryo and later into fetus. Pregnancy is status in which sign and symptoms vary from women to another, but

the general and common sign is missed menstrual period and Worse, frequent urination, increase weight.

Pregnancy is measured in trimesters from the first day of your last menstrual period, totaling 40 weeks. The first trimester of pregnancy is1 week to12 week, or about 3 months. The second trimester is13 week to 27 week, And the third trimester of pregnancy spans from28 week to the birth. During this period there is many change happen in the women body and vital substance such as the blood, hormones ,some enzymes and protein[12]

It is important to understand the normal physiological changes occurring in pregnancy as this will help differentiate from adaptations that are abnormal [13] .

Most of this 50% increase occurs by 34 weeks' gestation and is proportional to the birth weight of the baby .Because the expansion in plasma volume is greater than the increase in red blood cell mass, there is a fall in haemoglobin concentration, haematocrit and red blood cell count. Despite this haemodilution, there is usually no change in mean corpuscular volume (MCV) or mean corpuscular haemoglobin concentration (MCHC) [12].

In normal pregnancy, there is an increase in erythropoietic activity [14] . However, at the same time, an increase in plasma volume occurs[15] and this results in a progressive decrease in Hb, Hct and RBC . The level returns to normal about a week after delivery. There is a slight increase in MCV during the 2nd trimester [16]

Serum ferritin decreases in early pregnancy and usually remains low throughout pregnancy, even when supplementary iron is given [17] .

2.3: Causes of anemia in pregnancy:

Because of the normal physiologic changes in pregnancy that affect the hematocrit and certain other parameters, such as hemoglobin, reticulocytes, plasma ferritin, and unsaturated iron-binding capacity, diagnosing true anemia, as well as determining the etiology of anemia, is challenging. The most common anemias are iron-deficiency anemia and folate deficiency megaloblastic anemia. These anemias

are more common in women who have inadequate diets and who are not receiving prenatal iron and folate supplements. Other less common causes of acquired anemia in pregnancy are aplastic anemia and hemolytic anemia. In addition, anemias such as thalassemia and sickle cell disease can have an impact on the health of the mother and fetus.

As was stated above, the most frequent causes of true or absolute anemia are nutritional deficiencies. Frequently, these deficiencies are multiple, and the clinical presentation may be complicated by attendant infections, generally poor nutrition, or hereditary disorders such as hemoglobinopathies.[18,19] However, the fundamental sources of nutritional anemia embody insufficient intake, inadequate absorption, increased losses, expanded requirements, and insufficient utilization of hemopoietic nutrients. Approximately 75% of all anemias diagnosed during pregnancy are due to iron deficiency. Significant deficiency of iron leads to characteristic hypochromic, microcytic erythrocytes on the peripheral blood smear. Other causes of hypochromic anemias, even rare, must be considered, including hemoglobinopathies, inflammatory processes, chemical toxicity, malignancy, and pyridoxine-responsive anemia.

However the greater percentage of the remaining cases of anemia in pregnancy anemias, even rare, must be considered, including hemoglobinopathies, inflammatory processes, chemical toxicity, malignancy, and pyridoxine-responsive anemia.

However the greater percentage of the remaining cases of anemia in pregnancy other than the iron-deficiency type consists of the megaloblastic anemia of pregnancy due to folic acid deficiency and, to a lesser extent, to vitamin B12 deficiency. Anemia caused by deficiencies of other vitamins or elements does not commonly occur in humans.

Nutritional anemia is not a broad-based problem in the populations of developed countries. It is nevertheless a problem for many individuals in these countries, and

it is certainly a major health problem in poor, underdeveloped countries. Pregnant women as well as menstruating women and children make up the segment of the population in third-world countries and even in the United States and Europe that is affected by nutritional deficiency [20] .

In conclusion, the investigation of acquired anemias during pregnancy is very important, considering that inadequate nutrition and nutritional deficiencies have an adverse impact on pregnancy outcome, without excluding *a priori* other, less common types of anemia.

2.4: Maternal effect of anemia:

Obviously, severe anemia has adverse effects on the mother and the fetus. There is also evidence that less severe anemia is associated with poor pregnancy outcome.

Major maternal complications directly related to anemia are not common in women with a hemoglobin level greater than 6 g/dl. However, Hb levels even lower may lead to significant morbidity in pregnant women, such as infections, increased hospital stays, and other general health problems [19] .

A lot of symptoms and signs may accompany this clinical state, to a variable degree.The commonest of these are headache, fatigue, lethargy, paresthesia, and the clinical signs of tachycardia, tachypnea, pallor, glossitis, and cheilitis. In more severe cases, especially in pregnant women with hemoglobin levels less than 6 g/dl, significant life-threatening problems secondary to high-output congestive heart failure and decreased oxygenation of tissues, including heart muscle may be encountered.

Such conditions are rare as a result of nutritional deficiency anemias, at least in developed countries or when the pregnant woman receive iron supplementations.

However, severe iron deficiency anemia or methemorragic anemia may be presented by complications of pregnancy, such as placenta previa or abruptio placenta, operative delivery and post partum hemorrhage [21] These conditions if

untreated by iron supplementation or blood transfusion may lead to severe complications.

2.5: Effect of anemia in pregnancy:

There are a lot of indications that severe maternal anemia in pregnancy is associated with poor pregnancy outcome and that the cause of this association has yet to be elucidated[20] Moreover, what effects the maternal anemia has on the fetus are not well defined; however, several reports in the literature associate the reduction in hemoglobin level with prematurity, spontaneous abortions, low birth weight, and fetal deaths. Some authors believe that even a mild reduction in Hb level (8–11 g/dl) may produce a predisposition to these conditions; in contrast, other authors support a direct relationship between anemia and fetal distress only when the maternal Hb levels are less than 6 g/dl [22] It is important to know what effect the iron status of the mother has on the iron status of the fetus for definitive and correct conclusions about management. There are controversial opinions about this: some investigators found that levels of maternal iron exert little effect on that of the neonate at birth [23] On the other hand, studies of cord blood serum iron levels have shown a direct relationship between maternal and fetal iron levels [24] Additionally, when serum ferritin is used as an indicator of iron status, it was found that babies born to mothers who did not take iron supplements during pregnancy had reduced iron stores at birth [25.26] Most authors agree that only severe anemia may have direct adverse effects on the fetus and neonate and that a mild to moderate maternal iron deficiency does not appear to cause a significant effect on fetal hemoglobin concentration [24] .

There are several reports that correlate the anemia during pregnancy with prematurity and low-birth weight infants, indicating a direct relationship between low birth weight and low maternal Hb level [27.29]In a large epidemiologic study, it was shown that the risk of a preterm delivery was increased by 20% in pregnancies with Hb levels between 10 and 11 g/dl and by 60% in pregnancies with Hb levels

between 9 and 10 gr/dl. Below 9 g/dl, the risk was more than doubled, tripled, and so on for each fall of 1 gr/dl.[30] In the same study, no correlation was found between maternal Hb levels and growth retardation. In another large epidemiologic study, perinatal mortality was found to be tripled when the maternal Hb levels fell below 8 gr/dl in comparison with Hb levels above 11 g/dl.[31] In addition, Garn *et al*. demonstrated an association between low maternal Hb levels and poor pregnancy outcomes such as prematurity, low birth weight, fetal death, and other medical abnormalities with increasing complication rates when there were lower maternal Hb concentrations [32].

Nevertheless, all these reports are strong indications of an adverse effect of maternal anemia on fetal growth and pregnancy outcome. Nevertheless, it would be better, at least in cases of mild to moderate maternal anemia, to characterize these simply as possible risk factors rather than as an adequate evaluation indicating an obvious adverse impact on the fetus. Moreover, it is important to stress that low maternal Hb levels are often associated with other pathologic conditions, so it is difficult to be sure whether maternal anemia *per se* causes or even contributes directly to the increased mortality and morbidity rates. In other words, low Hb levels are often a secondary phenomenon caused by antecedent infections or chronic illnesses that in turn may lead to severe complications during pregnancy that do not fundamentally depend on the hematologic profile of the pregnant woman.

2.6: Previous study:

Many study state that :

Neha Y.Bivalkar, Dr.(Mrs) K.C.Wingkar and *etal:*

The percentage of anemia was 43.4 with more prevalence of moderate anemia in 2nd & 3rd trimester. According to blood indices & peripheral smear analysis predominantly microcytic hypochromic (55.4%) anemia was observed .In india at 18 October 2014.[33]

Meseret Alem and *etal:*the prevalence of anaemia was 83 (21.6%). majority(97.1%) of the pregnant womens had normocytic hypohromic red cells morphology.The majority of anemic cases 49% were mild type followed by 46% cases of moderate and 5% sever anaemia. Astudy has reported an increased incidence of anemia in the second and third trimesters compared with the first trimester.[34] And study done by Farah and Asma Mohammed revealed that there was statistically significant difference of Hb, MCV and MCH among study group compare to control group, and most of those anemic pregnant women were found to have IDA.[35]

3: Materials and Methodology

3.1: Study design:

This is descriptive cross sectional study that aimed to determine of anemia sub-types among pregnant women in Shendi town during the period from (March to August 2018).

3.2: Study area:

The study was conducted in Shendi town in Sudan which is located 172km north to capital Khartoum, southern part of river Nile state.

3.3: Study population:

Atotal of (75) blood samples were collected from pregnant women (50) anaemic as test and (25) samples pregnant women non anaemic as control group.

3-4: Inclusion criteria:

Pregnant women at different trimester and healthy pregnant women for control group.

3-5: Ethical consideration:

Each pregnant woman was told about the research importance during the interview and all of them were agreed to participate in this study and also agree with ethical committee of Medical laboratory Sciences of Shendi University.

3-6: Data collection tools:

Interview questionnaire was applied and filled.

3.7. Blood Sampling:

Venous blood collected using sterile disposable plastic syringe after cleaning the venepuncture area with(70%) ethanol, the blood added to the anticoagulant EDTA to perform CBC and Plain containers and separated by centrifugation to obtain serum to measure serum iron.

3.8. Data analysis:

The collection data was analyzed by statistical package of social science program (SPSS) by using (independent t test) .

3.9: Material and instrument:

-Cotton.

-Syringe.

-Plain container.

-Centrifuge.

-Automatic pipettes.

-Test tubes

- Spectrophotometer.

3.10. Methods:

3.10.1: Complete Blood Count (CBC):

Blood samples were drawn into a test tube containing EDTA and then mixed gently. RBCs count, HCT, Hb concentration, haematimetric indices (MCV, MCH, and MCHC), RDW, were measured by using an automatic blood cell counter (Mindray -3000 analyzers). The assay was performed according to the instructions provided by the manufacturer. The analyzer was controlled by normal control, abnormal high and abnormal low. The *EDTA* blood samples were aspirated into analyzer through a sample probe, and the counting was started automatically, the results were displayed on the screen within (20) second, the print key was pressed to print out the results.

3.10.2. Methods:

Serum iron:

Serum iron done by using spectrophotometer

Principle:

Transferrin-bound ferric ions in the sample are released by guandinum and reduced toferrous by means of ascorbic acid . ferrous ions with ferrozine forming acoloured complex that can be measured by spectrophotometer.

3.10.2.2 Reagent:

-Reagent A:4×40 ml. guandinium chloride 1.0molL,acetate buffer 0.4mol/L, pH4.0.

-Reagent B: 4×10ml.Ferrozine 8mmol/L, ascorbic acid 200mmol/L.

-Iron standard.1×5ml. iron 200ug/dL(35.8 umol/L).aqueous primary standard.

Procedure:

1-The reagent brought the room temperature.

2-Into labeledtest tube the following pipette:

-200Ulof distilled water into reagent blank tube.

-200uLof sample into tube of sample and sample blank tube.

-200uL of iron standar(s) into tube of standar tube.

-1mL of reagent (A)into sample blank tube.

-1mL of working reagent into reagent blank ,sample blank and standar tube.

3-Mixed thoroughly and the tube stoodfor 5 min at room temperature.

4-Absorbance(A)of the sample and of the standar read at 560 nm against reagent Blank.

Calculation:

The iron concentration in the sample is calculated using the following formula:

A sample-Asample blank/A standar×C standar=C sample

Normal range:

Men: 65—175 ug/dl

Women 50—170ug/dl

Pregnant 30 – 50 ug/dl.

4. Results

A total of (50) blood samples collected from anemic pregnant womens and (25) samples collected as control from healthy pregnant womens.

Table (4.1): Distribution of the study population according to stage of pregnancy.

Trimester	Frequency	Percent (%)
First	7	14
Second	14	28
Third	29	58
Total	50	100

Table (4.2): Degree of anemia according to stage of pregnancy.

	Anemia degree		Total
	Mild	Moderate	
First	7	0	7
Second	14	2	16
Third	24	3	27
Total	45	5	50

Table (4.3) :Mean of Hb concentration according to degree of anemia among study group

Degree	Hb	Frequency	Percent (%)
Mild	10.1	22	44
Moderate	9.2	28	66

Table (4.4) : Mean of Hb in case according to age group

Age	Mean Hb	Frequency	Percent (%)
15 – 25	9.7	22	44
26 – 35	10.1	22	44
Above 35	8.8	6	12

Table (4.5) : Mean of Hb level among pregnant women that intake Folic acid

Drug	Frequency	Mean Hb
No	24	9.5
Yes	26	9.9

P .value:0.406

Table (4.6):Mean level of Hb among pregnant women that intake Iron

Drug	Frequency	Mean Hb
No	3	9.9
Yes	47	9.7

P.value:0.406

Table (4.7): Type of anemia in study group

	Frequency	Percent%
Normocytic normochromic	20	40%
Microcytic hypochromic	30	60%
Total	50	100%

Table(4.8): Mean of Hb and RBCs indices in test and control.

Parameter	Test	Control	P.Value
Hb(g/dl)	9.6	11.8	0.00
PCV(%)	29	35	0.00
MCV(Fl)	68	79	0.00
MCH(pg)	23.3	27.5	0.00
MCHC(g/dl)	33	34	0.15
RDW	15.7	14	0.00

5.1 Discussion

Anemia is a worldwide, including Sudan, public health problem which increases the risk of maternal and child morbidity and mortality, impaired cognitive and physical development of children and decrease work productivity in adults. Prevention and control of anemia among pregnant women are there fore a key measure to reduce the adverse effects of anemia, which will help to have healthy and productive future generation. So identifying the determinant of anemia is an input to take evidence based interventions. The overall prevalence of anaemic in the study was 66.7%.

Higher number of pregnant women anemic was found in third trimester 29(58%) and followed by second 14(28%) compared to those in first trimester was 7(14%). This can be related to increased nutritional need for the rapidly growing fetus during third trimester as shown in table (4-1) .

The study revealed the degree of anemia in first trimester was mild (7), in second trimester was (14) and moderate (2) and most of them occur in third trimester. Mild (24) and moderate (5).This result was similar to the result of study conducted by Neha Y.Bivalkar, Dr.(Mrs) K.C.Wingkar and *etal* table (4-2).

The result of this study demonstrated that the mean of Hb value in mild anemia in study group was (10.1g/dl), While the mean Hb in moderate anemic was (9.2g/dl) table (4-3).

The mean of (Hb) level according to age group (15—25)years was (9.7g/dl), while in (26---35) years was (10.1 g/dl) and in more than 35years was (8.8gdl) table (4-4).

The present study denoted the mean (Hb) level was(9.9g/dl) in anemic pregnant intake folic acid while the mean in those don’t having folic acid was(9.5g/dl) Statistical analysis showed there was no significant variation with (p.value0.406) table (4-5).

The result also obtain that the iron intake have no effect in anemic pregnant, which found that the mean of (Hb) level was (9.9g/dl) in anemic pregnant don't having iron ,while (9.7g/dl) in those having iron intake, due to irregular taking of drugs in time or defect in absorption of iron drugs. Statistical analysis demonstrated that there was no significant variation (p.value . 0.406) table(4-6).

Most of those anemic pregnant women (60%) were found have IDA while (40%) had normocytic normochromic table (4-7). This result was similar to the result of study conducted by Neha and et al and also agree with other study conducted by Farah,Asma Momhammed.

The study revealed the mean of (Hb ,PCV, MCV and MCH) were (9.6, 29, 68 and 23.3) and (11.8,35,79 and 27.5) in test and control respectively , when compared between them this result were statistically significant difference with P.value <0.05, As shown in table (4-8), This result was similar to the result of study conducted by Farah and Asma Mohammed in Khartoum teaching hospital at 2012 .

5.2 Conclusion

1. The prevalence of anemia among study group was (66.7%) and the mean of Hb level was (9.6g/dl).
2. A majority of pregnant women have moderate anemia (28, 66%), followed by mild (22, 44%).
3. Microcytic hypo chromic anemia found in 30 pregnant women and the serum iron was 24mg/dL .

5.3 Recommendations

1. Hb shoud be checked regularly in pregnant womens.
2. Health education about causes of anaemia.
3. Consumption of more diversitied extra meal and iron rich foods.
4. Further study in this topic should be done with increasing sample size

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Questionnaire About the detection of type of Anaemia Among Pregnant Women in Shendi

1. Name:

2. Age:

4. Residence:

5. Education: Illiterate( ) Primary ( ) Secondary( ) Higher( )

6. No, of Children:

7. Spacing between children;

8. Age at first birth ;

10 . Do you breastfeed ? Yes( ) No( )

11. Till what age do you breastfeed ?

12. Types of foods that you eat almost daily :

Metal ( ) Vegetables ( ) Cereals( ) Milk and milk product( ) Mixed ( )

13. Have you measured your Hb level before? Yes ( ) No( )

14. Are you taking iron tablets? Yes ( ) No ( )

15. Do you suffer from any pregnancy illness (morning sickness) ?

Yes ( ) No( )

19. Did you suffer from any of the following diseases

– Malaria ( ) Thyphoid ( ) Dysentry( ) Hookworm / tapeworm / Gardia ( )

- Gastrointestinal bleeding ( )- Gastroctomy ( ). - Malaginancy of Glf ( )

- Haemorrage ( )

20. Do you suffer from the following symptoms

- Lethargy ( ) Weakness ( ) Dizziness ( ) Palpitations particularly on exertion ( )

- Nails spoon shaped ( )

Results:

Iron level: