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ANEMIA AMONG PREGNANT WOMEN IN IRAQ

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ABSTRACT

Anemia is one of the most frequent complications related to pregnancy. Normal physiologic changes in pregnancy affect the hemoglobin (Hb), and there is a relative or absolute reduction in Hb concentration. The most common true anemias during pregnancy are iron deficiency anemia (approximately 75%) and folate deficiency megaloblastic anemia, which are more common in women who have inadequate diets and who are not receiving prenatal iron and folate supplements. Severe anemia may have adverse effects on the mother and the fetus. Anemia with hemoglobin levels less than 6 gr/dl is associated with poor pregnancy outcome. Prematurity, spontaneous abortions, low birth weight, and fetal deaths are complications of severe maternal anemia. Nevertheless, a mild to moderate iron deficiency does not appear to cause a significant effect on fetal hemoglobin concentration. A Hb level of 11 gr/dl in the late first trimester and also of 10 gr/dl in the second and third trimesters are suggested as lower limits for Hb concentration. In an iron-deficient state, iron supplementation must be given and follow-up is indicated to diagnose icon unresponsive anemias.

KEYWORDS: Anemia, pregnant women.

INTRODUCTION

Antenatal care (ANC) is care provided by skilled health care professionals to pregnant women to ensure the best health outcomes for the mother and her baby, both during and immediately after pregnancy. Quality ANC includes risk identification; prevention and management of pregnancy-related or concurrent diseases; and health education and health promotion. ANC reduces maternal and perinatal morbidity and mortality both directly, through detection and treatment of pregnancy-related complications, and indirectly, through the identification of women at increased risk of developing complications during labor and delivery and referral to the appropriate level of care.[1]

Most cases of anemia in pregnant women are a result of insufficient iron levels to meet the increased requirements of pregnancy. Severe iron-deficiency anemia has been associated with an increased risk of stillbirths, low birthweight babies, intrauterine growth restriction, neonatal sepsis, infant and maternal mortality. Moderate anemia has been found to restrict the ability of mothers to work and care for their children.[2]

According to the WHO, the incidence of anemia among pregnant women is increasing, with more than 30 million (38.2%) pregnant women with anemia around the world. Moreover, that number is predicted to increase significantly in the future.[3]

Anemia is a condition in which the body experiences a decrease in red blood cells and impaired oxygen delivery via blood. These conditions differ by sex, age, and physiological conditions, such as pregnancy, as well as the presence of genetic diseases.[4] The negative effects of anemia in pregnant mothers can occur in the short and long term. However, the most notable effect of anemia in pregnant women is on pregnancy outcome. Studies have shown that problems, such as inhibited fetal growth, bleeding during labor and low infant weight and placental size, occur when mothers experience anemia during pregnancy.[5]

In developing countries, the problem of anemia in pregnant mothers is worrying. A study in Ethiopia showed that the prevalence of anemia in pregnant mothers who were receiving antenatal care services reached 39.1%,[6] while in Indonesia, the prevalence of anemia among pregnant mothers in the countryside reached 37.8%, according to a basic health research survey in 2013.[7]

Anemia is characterized by a hemoglobin level (Hb) less than normal; in pregnant women, Hb <11 g/dL indicates anemia.

A major contributor to anemia in pregnant mothers is the lack of dietary intake of iron (Fe).[8] In addition, most pregnant mothers from developing countries (low-middle income) begin their pregnancy with deficiencies in certain nutrients, including iron; therefore, fulfilling the iron requirements of the mother and fetus is difficult.[9] Furthermore, disease factors (parasitic infections, malaria, etc.), workload, social conditions, pregnancy history, menstruation, and bleeding history also require attention. Although anemia is a controllable disease, most individuals are unaware that they are anemic. Therefore, anemia remains prevalent, especially in developing countries.[10]

Background

Anemia is one of the most frequent complications related to pregnancy. The word implies a decrease in the oxygen-carrying capacity of the blood and is best characterized by a reduction in hemoglobin concentration. This may be either relative or absolute. It is known that there is a larger increase in plasma volume relative to red cell mass in almost all pregnancies, and it accounts for “physiologic anemia.” These alterations have been known for centuries, and the term “plethora gravidarum” from medieval ages indicates this condition. However, it is still an open question to what extent this “hydremia” is physiologic or pathologic. There are two contrasting medical philosophies covering this problem. According to the first, it is preferable to prevent pregnant women from developing too low hemoglobin concentrations.

According to another point of view, the “physiologic anemia” is of great importance for normal fetal growth and should be passively observed. Moreover, the relationship between a successful outcome of pregnancy and this normal expansion in maternal plasma volume has been noted.[11] This controversy is reflected in the recommendations from the World Health Organization on the optimal hemoglobin (Hb) concentrations or hematocrit (Hct) level. Thus, in 1965 a WHO expert committee suggested that 10 gm/dl should be accepted as the lower limit of the physiologic adjustments made during pregnancy.[12]

PHYSIOLOGIC BACKGROUND

The plasma volume starts to increase at about 6 weeks of pregnancy in a healthy woman.4 This increase, which is disproportionately greater than the corresponding changes on the red cell mass, accounts for the physiologic fall in the Hb concentration during pregnancy. As a consequence, there is a significant reduction in arteriovenous oxygen extraction at the heart and an important increase of the oxygen-carrying capacity of the pregnant woman, despite the fall in the Hb level. The increase in plasma volume is about 1,250 ml at term, a total increase of about 48% above the nonpregnant state. This is the result of an initial rapid rise, followed by a slower rise after the 30th week of pregnancy. Several studies demonstrate the positive correlation between the weight of the newborn and the increase in the plasma volume.[13]

It seems that the increase in plasma volume is an indication of the normal growth of the fetus and one of the hallmarks of a successful pregnancy. As regards the red cell mass, it also increases although, in contrast to the plasma volume, it does so more slowly. The total increase is about 18% or 250 ml at term. After stimulation with iron supplements, however, the red cell mass may reach 400 ml—a total increase of about 30% compared with the nonpregnant state. Similar to the plasma volume, the increased red cell mass is linked to fetal growth, although probably to a lesser degree.[14]

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.[15]

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.[16] 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. A 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 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, sometimes accompanied by frank anemia.[17]

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.

MATERNAL EFFECTS 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 gr/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.[18]

A lot of symptoms and signs may accompany this clinical state, to a variable degree. The commonest of these are a 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 gr/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. These conditions if untreated by iron supplementation or blood transfusion may lead to severe complications.[19]

EFFECTS ON THE FETUS

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. 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 gr/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 gr/dl.[20] 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.[21]

On the other hand, studies of cord blood serum iron levels have shown a direct relationship between maternal and fetal iron levels. 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.[22] 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. There are several reports that correlate the anemia during pregnancy with prematurity and low-birthweight infants, indicating a direct relationship between low birth weight and low maternal Hb level.[23]

There are conflicting views on the optimal Hb concentrations during pregnancy. One of the reasons for this is that the prepregnant hematologic state of the woman is rarely known, and this, to a large extent, determines the hematologic reactions during pregnancy. Thus, one important parameter is the knowledge of normal nonpregnant Hb variation. Another point is the use of ±2 SD as limits for the variation of Hb levels during pregnancy. Finally, it is best to consider what is known about the physiological changes in plasma volume and in red cell mass during pregnancy that leads to physiological anemia. In the nonpregnant state, Hb and Hct values are more indicative of the plasma volume than of the red cell mass in women. It is possible that individual factors influence the plasma volumes from consistently high to average or low.[24]

There is also often a gradual transition from normal iron stores to slight or moderate iron deficiency anemia during which the symptoms are inconspicuous. Two-thirds or more of healthy women of reproductive age in several countries have been found to have scanty or absent iron stores.[25] This situation may have not consequenced in a nonpregnant state but during pregnancy, such women are at a variable risk of developing frank anemia. The normal variations of Hb and Hct values in a nonpregnant state are wide. In one study, however, which is in close agreement with the results of many others,[26] young, healthy, nonpregnant women have the following values: Hb: 12.3 ± 0.9 gr/dl (range, 11.4–14.3 gr/dl); Hct: 38% ± 3 (range: 34–45%). It is important to ask, however, what is the optimal (or normal) Hb level for pregnant women and what is the lower limit of normal variation? This is a very difficult problem for which there are a lot of conflicting views and strong discrepancies. Nevertheless, there is fairly good agreement among several investigators that the lower limit of normal physiologic variation of Hb levels is about 10 gr/dl.[27]

This lowest value occurs in weeks 25 and 26 with a mean Hb value of 11.4 gr/dl, making the lower (± 2 SD) limit 9.8 gr/dl, 26 a figure very close to the lower limits of 10 gr/dl and 10.4 gr/dl of two other reports.[28]

In the other trimesters of pregnancy, a Hb level of 11 gr/dl in the late first trimester and of 10 gr/dl in the third trimester are suggested as lower limits for Hb concentration. Koller et al. investigated the optimal Hb levels in iron-supplemented pregnant women and created a diagram based on the results of uncomplicated pregnancies resulting in healthy, normal neonates.[29] This pregnant population routinely used iron supplementation of 100 to 200 mg Fe per day (both doses have about the same effect on Hb levels). According to the results of this study, it is remarkable that supplements had very little influence on the Hb levels before 25 weeks of gestation, although from that time on, these levels increased gradually compared with those of unsupplemented women. Other authors supported that the difference at term between Hb levels in pregnant women with or without iron supplementation will be about 1 gr/dl.

About 3%, pregnant women have Hb levels below the lower limit of 10 gr/dl in the second trimester, whereas the corresponding number in the third trimester is 1%.[30] The decrease in Hb concentration is positively correlated with the prepregnancy Hb value.24 The low values (10 to 11 gr/dl) often show no drop in value, however.28 This may be explained by considering that these low values indeed represent iron deficiency anemia that reacts rapidly to iron supplementation with hemoglobin production, thus preventing a further drop in Hb concentration. It is remarkable that this “resistance” to further decrease in Hb levels also appears in pregnant women without iron supplementation. It may represent a physiologic “adaptation” to pregnancy in order to keep the Hb concentration at sufficient levels for placental perfusion. The 24 Another explanation is that women with low prepregnancy Hb levels may have larger plasma volumes than the women with higher Hb levels, and as a consequence, they do not experience the plasma expansion that appears at early stages of pregnancy.[31]

The majority of all anemias diagnosed during pregnancy are characterized as iron deficiency anemias. It is estimated that about 80% of pregnant women at term who do not use iron supplementation have hemoglobin concentrations less than 11 gr/dl.[32] The increased fetal need for iron as well as a number of other factors constitutes the iron-deficiency profile of the pregnant woman and the need for supplementation. The factors contributing to that state include poor iron absorption during pregnancy, multiple gestations or successive gestations less than two years apart, adolescent pregnancy, and any associated chronic blood loss, as well as decreased amounts of total body iron before the pregnancy. The most usual clinical symptoms of iron-deficiency anemia are lethargy and fatigue, although they are also seen in normal pregnancy. Other symptoms are a headache, paresthesia, burning sensation of the tongue, and pica, which is the ingestion of substances with no dietary value and appears in severe cases of anemia after the twentieth week of gestation. Glossitis, pallor, and inflammation of the lips (cheilitis) are clinical signs of iron deficiency, whereas koilonychia and “spooning” nails are fewer common findings. In cases of severe anemia, retinal bleeding, conjunctivitis, tachypnea or tachycardia, and splenomegaly may be presented. Nevertheless, these signs are rarely seen in developed countries because of the rarity Hb levels of 5 or 6 gr/dl.[33] Some authors support a correlation of iron-deficiency anemia with defects in cellular immunity and decreased defense to bacteria by white blood cells, but it is not clear whether this immune depression associated with anemia, predisposes a person to infection.[34]

The laboratory evaluation of iron-deficiency anemia is quite difficult because of the physiologic hydremia of pregnancy and the subsequent changes in the values of the main hematologic parameters. Moreover, a differential diagnosis must be done between the hypochromic microcytic anemia of iron deficiency and other hypochromic anemias such as hemoglobinopathies or anemias induced by chemicals or inflammatory processes or malignancies. In these conditions, the mean corpuscular volume (MCV) is often decreased, although it is the rule in iron-deficiency anemia.[35] The expected increase in the red blood cell mass after week 20 of gestation will not be observed if iron stores are depleted. The serum iron levels decline as pregnancy advances for the reasons presented above. Values < 30 g/dl are usually diagnostic of iron deficiency, but the best indicator for this is the measurement of serum ferritin (normal values in pregnancy: 55–70 μg/l). Additionally, quite a good indication is the transferrin saturation, which in iron deficiency is < 15%. Some authors consider the unsaturated iron-binding capacity (UIBC) an important marker of iron deficiency states, when it takes values > 400 µg/dl.35 The earliest tissue indicator of an iron-deficient state is decreased iron stores in the bone marrow, but aspiration in pregnancy is usually not indicated.[36]

METHODS

This cross-sectional study was conducted from July to September 2018. and was divided into two stages. The first stage was the screening stage, which aimed to determine the prevalence of anemia in pregnant mothers. The second stage involved collecting basic data regarding the anemia determinant factors of pregnant mothers. A total of 550 pregnant mothers.

The calibrated Diaspect TM tool was used to measure Hb concentration. The blood of pregnant women was obtained through a finger prick by a trained enumerator.

The potential determinant factors measured in this study include the following: Household characteristics, pregnancy history, maternal age, enrollment in supplementary feeding (PMT) programme, and dietary pattern. The variables were measured using structured questionnaires that were developed and used in previous studies. The pregnancy history was also confirmed through the medical records of the mothers at the community health clinic, while dietary patterns were collected by 24 h food recall. The inclusion criteria were (1) Hb of 9–12 g/dL or individuals without severe anemia, (2) mid-upper arm circumference ≥21 cm with or without severe chronic energy deficiency (CED), (3) aged 20–35 years, (4) single fetus, and (5) did not consume other multivitamins. The data management team made multiple inputs to maintain the validity of the data. Descriptive and analytic data were analyzed. Chi-square analysis was performed to determine the correlation between the determinant variable and the dependent variable (anemia).

RESULTS AND DISCUSSION

Table 1. Distribution of sample according to age, occupation and anemia

Age (years)	No. = 550	%
<20	71	12.9
20-29	343	62.4
30-39	135	24.5
≥40	1	0.2
Mean age (26.5± 7.5)		
Occupation	No. = 550	%
House wife	472	85.8
Working	65	11.8
Student	13	2.4
Anemia	No. = 550	%
Normal (>11g\dl)	299	54.4
Mild (9-10.9 g\dl)	142	25.8
Moderate (7-8.9 g\dl	100	18.2
Severe (<7 g\dl)	9	1.6

Table 2

Age (years)	Severity of Anemia				
	Normal	Mild	Moderate	Severe	Total
<20	5 7.0%	27 38.0%	34 48.0%	5 7.0%	71 100%
20-29	223 65.0%	69 20.1%	49 14.3%	2 0.6%	343 100%
30-39	71 52.6%	46 34.1%	17 12.6%	1 0.7%	135 100%
≥40	-	-	-	1 100%	1 100%
Total	299 54.4%	142 25. %8	100 18.2%	9 1.6%	550 100%

Anemia has become a public health nutrition problem that primarily affects pregnant women. In developing countries, such as India, Pakistan, and Indonesia, more than 50% of pregnant mothers have iron deficiency anemia. In Indonesia, the prevalence of anemia in pregnant mothers reached 37.1% in 2013.[37] This study indicates that the problem of anemia in Iraq is worrying. When compared with the prevalence of anemia globally and nationally, the prevalence of pregnant mothers with anemia is slightly higher. Anemia is often associated with adverse pregnancy outcomes, which can even impact the health of children in the future.[38] Anemia in early pregnancy can increase the risk of miscarriage, prematurity, and death of the mother and child.[39]

To overcome this issue, studies and supplementation programmes for both iron and other multimicronutrient deficiencies have been established for pregnant women, including those in Indonesia.[40]

There are two main findings of this study, namely, the prevalence of anemia and determinant factors of anemia among pregnant women. This study showed a disparity among areas regarding anemia prevalence although the difference was not significant. This result may be due to the characteristics of subdistricts and the distances to health services are similar. In addition, differences in accessibility, affordability, and acceptance by communities will make a difference in health outcomes in the population.[41] A study has explained the role of various factors in the occurrence of anemia, including demographics and infections.[42] In the countryside, anemia is often caused by nutritional deficiency, chronic disease, and chronic blood loss.[43] Socioeconomic factors, demographics, and geography also affect the prevalence of anemia in pregnant mothers.[44] The second note of result showed that gestational age, receiving PMT program, and food group intake was associated significantly to anemia events. In another study, the determinants of anemia were gestational age.[45] Therefore, the need for iron increases significantly with an increase of gestational age, and if the mothers do not increase dietary iron intake, both the mother and the fetus will experience iron deficiency.

Although in this study, age variables were not significantly correlated with anemia, there was a trend of increased anemia prevalence among pregnant mothers over the age of 26 compared to those <26 years old. A study has previously reported an increased incidence of anemia among pregnant mothers over 26 years of age.[46]

However, this mechanism cannot be explained in detail and thus requires further study. Beside gestational age, receiving the PMT program is proven to be determinants of anemia. Anemia was more prevalent among pregnant mothers who received the PMT program than among those who did not receive the PMT program (57% vs. 38%).

These findings are supported by previous studies that have shown that the PMT program could affect both maternal and infant conditions. Fundamentally, the government provides a PMT program to anticipate malnutrition during pregnancy. This programme is specifically tailored for malnourished mothers. Supplementation programmes, such as supplemental feeding (PMT) programs, are quite effective at improving the nutritional statuses of pregnant mothers. However, nutritional supplementation should begin during the preconception period to achieve optimal fetal growth.[47]

Anemia is a major health problem that affects 25% to 50% of the population of the world the prevalence of anemia in pregnancy shows great variations in different parts of the world. Studies from industrialized countries show that 45% of pregnant women have a Hb less than 11 whereas the prevalence is generally higher and the variation is greater in developing countries with 90% anemia.[48]

Anemia in pregnancy is associated with increased rates of maternal and perinatal mortality, premature delivery, low birth weight, and other adverse outcomes.[49]

In this study, most of the pregnant belong to the age of 20-29 years and the mean age of pregnant women was 26.5 ± 7.5 years.

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