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Public Health Directorate
Nutrition Research Institute

Prevalence of anemia in pregnant women attending a sample of sentinel centers in Iraq

By

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List of abbreviations

d.f……Degree of Freedom

Hb……...Hemoglobin

HIV……Human Immunodeficiency Virus

IDA……Iron Deficiency Anemia

P ……Probability

X^2 ……...Chi square

Summary

The current cross sectional study is an attempt to assess the prevalence of anemia among pregnant women visiting Primary Health Care Centers in fourteen governorates; the study was conducted for the period from 1-5 July 2012.

The sample was comprised of 2295 subjects; a questionnaire was especially designed for this study, anemia was diagnosed by using Hemocue devices and defined by a Hemoglobin level of less than 11 gm/dl.

The prevalence of anemia according to the study was (39.4%) which was found to be significantly associated with gestational and maternal age , the highest percentage of anemia was found in Basrah (68.4%) followed by Babel (around 45%), and the least prevalence of anemia is in Diala (23%) compared to the national average of anemia (37.9%).

Introduction

Anemia: a public health problem

Anemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development. It occurs at all stages of the life cycle, but is more prevalent in pregnant women and young children. In 2002, iron deficiency Anemia (IDA) was considered to be among the most important contributing factors to the global burden of disease (*1*).

Etiology

Anemia is the result of a wide variety of causes that can be isolated, but more often coexist. Globally, the most significant contributor to the onset of Anemia is iron deficiency so that IDA and Anemia are often used synonymously, and the prevalence of Anemia has often been used as a proxy for IDA. It is generally assumed that 50% of the cases of Anemia are due to iron deficiency (2), but the proportion may vary among population groups and in different areas according to the local conditions. The main risk factors for IDA include a low intake of iron, poor absorption of iron from diets high in phytate or phenolic compounds, and period of life when iron requirements are especially high (i.e. growth and pregnancy). Among the other causes of Anemia, heavy blood loss as a result of menstruation, or parasite infections such as hookworms, ascaris, and schistosomiasis can lower blood haemoglobin (Hb) concentrations. Acute and chronic infections, including malaria, cancer, tuberculosis, and Human Immunodeficiency Virus (HIV) can also lower blood Hb concentrations. The presence of other micronutrient deficiencies, including vitamins A and B12, folate, riboflavin, and copper can increase the risk of Anemia. Furthermore, the impact of haemoglobinopathies on Anemia prevalence needs to be considered within some populations (2).

Health consequences

Anemia is an indicator of both poor nutrition and poor health. The most dramatic health effects of Anemia, i.e., increased risk of maternal and child mortality due to severe Anemia, have been well documented (3). In addition, the negative consequences of IDA on cognitive and physical development of children and on physical performance – particularly work productivity in adults – are of major concern (2).

Assessing Anemia

Hemoglobin concentration is the most reliable indicator of Anemia at the population level, as opposed to clinical measures which are subjective and therefore have more room for error. And the cutoff level for assessing anemia via Hb concentration by age is illustrated in table (1) .Measuring Hb concentration is relatively easy and inexpensive, and this measurement is frequently used as a proxy indicator of iron deficiency. However, Anemia can be caused by factors other than iron deficiency (4). In addition, in populations where the prevalence of inherited haemoglobinopathies is high, the mean level of Hb concentration may be lowered. This underlines that the etiology of Anemia should be interpreted with caution if the only indicator used is Hb concentration. The main objective for assessing Anemia is to inform decision-makers on the type of measures to be taken to prevent and control Anemia. This implies that in addition to the measurement of Hb concentration, the causes of Anemia need to be identified considering that they may vary according to the population (5).

Table (1): hemoglobin threshold used to define anemia

Haemoglobin thresholds used to define anaemia

Age or gender group	Haemoglobin threshold (g/l)
Children (0.50–4.99 yrs)	110
Children (5.00–11.99 yrs)	115
Children (12.00–14.99 yrs)	120
Non-pregnant women (≥15.00 yrs)	120
Pregnant women	110
Men (≥15.00 yrs)	130

Source: adapted from reference (2)

Anemia, as a public health problem, can be classified according to its prevalence severity as shown in table (2), as of public health significance (5).

Table (2): Classification of anemia as a problem of public health significance.

Classification of anaemia as a problem of public health significance

Prevalence of anaemia (%)	Category of public health significance
≤4.9	No public health problem
5.0–19.9	Mild public health problem
20.0–39.9	Moderate public health problem
≥40.0	Severe public health problem

Source: adapted from reference (2)

The prevalence of anemia in pregnant women in World Health Organization regions are as shown below (6).

- Africa → 57.1 %
- America → 24.1 %
- South-east Asia → 48.2 %
- Europe → 25.1 %
- Eastern Mediterranean →44.2 %
- Western pacific → 30.7 %
- Global →41.8 %

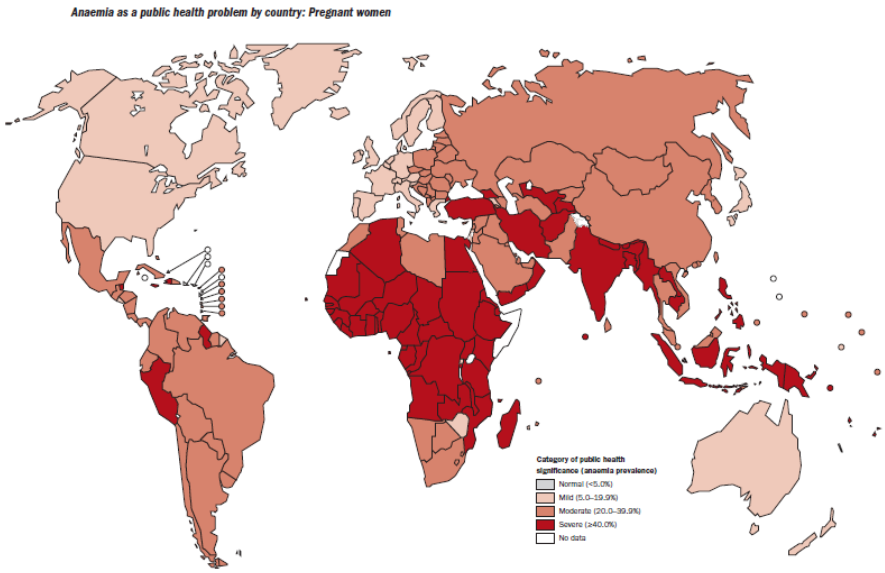
Correcting Anemia

Given the multifactorial nature of this disease, correcting Anemia often requires an integrated approach. In order to effectively combat it, the contributing factors must be identified and addressed. In settings where iron deficiency is the most frequent cause, additional iron intake is usually provided through iron supplements to vulnerable groups; in particular pregnant women and young children. Food based approaches to

increase iron intake through food fortification and dietary diversification are important, sustainable strategies for preventing IDA in the general population. In settings where iron deficiency is not the only cause of Anemia, approaches that combine iron interventions with other measures are needed. Strategies should include addressing other causes of Anemia and should be built into the primary health care system and existing programmes. These strategies should be tailored to local conditions, taking into account the specific etiology and prevalence of Anemia in a given setting and population group (4, 5).

For Iraq, the total prevalence of Anemia in currently pregnant women is 37.9%. The mean haemoglobin level is 11.3g/dl. There is higher prevalence of Anemia among the younger age group of 15-19 and 25-29 cohort, with 40.7% and 42.9% respectively. Women in rural areas have higher prevalence of Anemia 40.8% than women in urban areas 36.0%. Anemia in the south/center region 38.2% is higher than in Kurdistan region 34.1 % (7). Globally, Figure (1) shows Anemia distribution in pregnant women by country (6).

Figure (1): Anemia as a public health problem by countries (pregnant woman).



Aims of the study

To estimate the prevalence of anemia among pregnant women in Iraq and the distribution of anemia by different biological, environmental and demographical factors and their association with anemia.

Subjects and methods

A cross sectional study was carried out on 2295 consecutive convenient sample of pregnant women who attend the anti-natal care units from (14) provinces, one district per each province was selected based on the result of the Comprehensive Food Security and Vulnerability Analysis 2008, three Primary Health Care Centers from each district were selected conveniently (except for Basrah and Baghdad/Al-Rusafa which comprised of 4 health centers), and 50 women from each health center were included in the study.

The study extends from 1stto 5th of July 2012. Data were collected through a questionnaire (Annex 1) which was especially designed for this study.

Anemia assessment:

After informing the woman about the study and obtain her consent to be included in the study; Anemia was assessed by measuring Hemoglobin level using Hemocue. The cut off level of hemoglobin for detecting anemia in pregnancy is below 11.0 gm/dl, the blood was collected through finger prick.

Test Principle

The HemoCue measures the hemoglobin concentration in whole blood as azidemethemoglobin, utilizing a microcuvette containing a dry reagent system and a dual wavelength photometer. Sodium desoxycholate lyses the erythrocytes, releasing the hemoglobin. Sodium nitrite converts the hemoglobin iron from the ferrous to the

ferric state to form methemoglobin. The methemoglobin then combines with azide to form azidemethemoglobin and is measured photometrically at two wavelengths, 570nm and 880nm.

Specimen

The HemoCue measures hemoglobin using capillary, venous or arterial blood. EDTA (purple top tube) is the recommended anticoagulant for venous or arterial blood. Venous or arterial blood may be tested directly from a syringe. Note: It is very important to test the sample immediately to avoid potentially erroneous results due to coagulation or separation of the specimen (8).

Statistical analysis:

After Data were collected, an electronic data entry form was designed using SPSS statistical package then data were analyzed using SPSS and the results were presented in the form of charts and tables and statistical inferences were conducted using chi-square test for testing the significance of association of different indicators under study.

Results and Discussion

The highest proportion of the study sample were in women between the age of 19-39 years (86.1%), and the least proportion were of the age 40 and more (2.6%).whereas under the age of 18 was only (11.3%) as in table (3).

Table (3): shows the Frequency distribution of the sample according to age groups.

Age group	Frequency	Percentage
Less or equal to 18	259	11.3
19-39	1972	86.1
40 and more	60	2.6
Total	2291	100

The highest proportion of the study sample just completed the primary school (32.2%) and the least proportion completes the college (4.1%) as in figure (2).

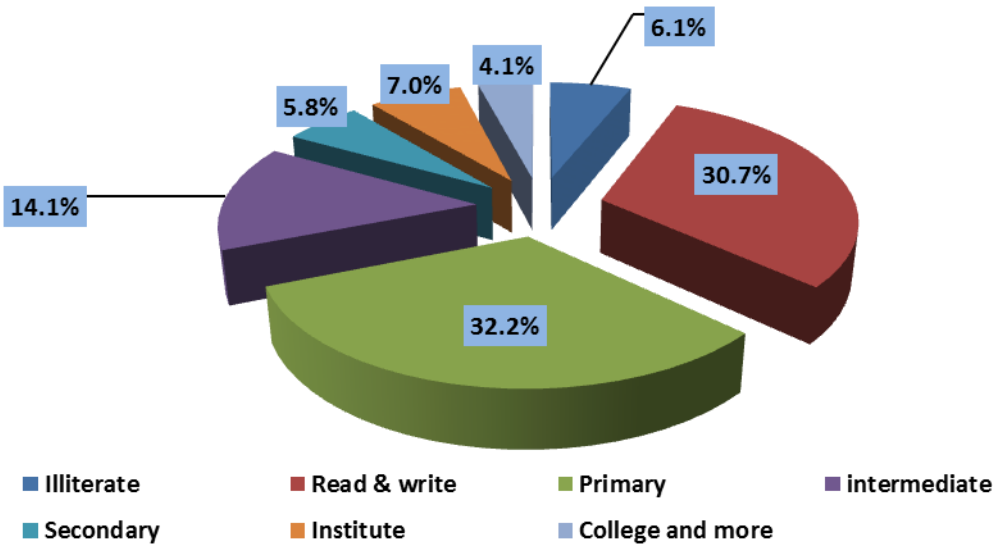


Figure (2) shows the frequency distribution of the study sample according to educational level.

Most of the cases included in the study sample were Housewives (91.5%), whereas the least proportion were students (1.4%) as shown in table(4).

Table (4): shows the frequency distribution of the sample according to occupation.

Occupation	Frequency	Percentage
Housewife	2087	91.5
Employer	161	7.1
Student	33	1.4
Total	2281	100.0

Most of the cases (61.3%) were those with parity of (2-4) pregnancies and the least were with parity of (5& more) and represents (13.1%) as in table (5).

Table (5): Frequency distribution of the sample according to number of pregnancies (parity).

Parity	Frequency	Percentage
Less than 2	589	25.7
2 - 4	1406	61.3
5 and more	300	13.1
Total	2295	100.0

Around three quarters of the study sample were taking the iron folate supplement (71.2%), where as those who do not taking the supplements were only (28.8%). Also, about three quarters of the study sample were taking the supplements regular (73.1%), and about (26.9%) were taking the supplements irregular as shown in figure (3).

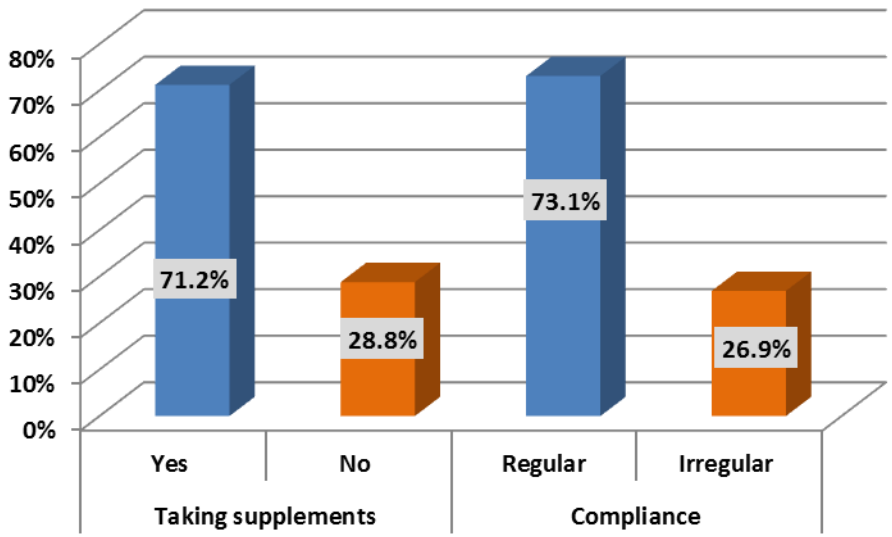


Figure (3): The distribution of pregnant women by the use of iron folate supplement and the regularity of its intake.

The highest proportion of pregnant women in the study sample attribute the reason of not taking the iron folate supplements as it was not prescribed in about (57.6%) followed by an equal percentages in those responded as the supplements being not available and suffered from side effects (20.3%) as shown in figure (4).

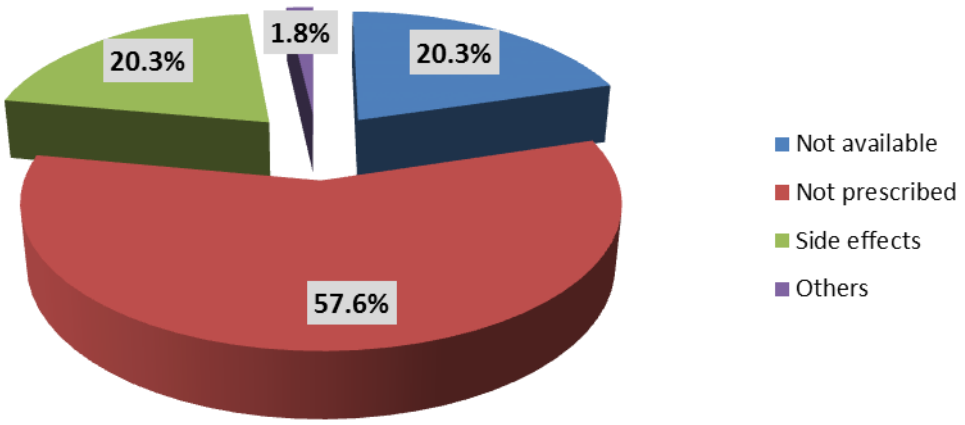


Figure (4) :The distribution of pregnant women by the reason of not using iron folate supplements.

The prevalence of anemia according to this study was (39.4%) with a mean Hb level is (11.3 g/dl) and the highest percentage of anemia was found in Basrah (68.4%) followed by Babel (around 45%) and the least prevalence of anemia is in Diala (23%) compared to the national average of anemia (37.9%) as in figure (5).

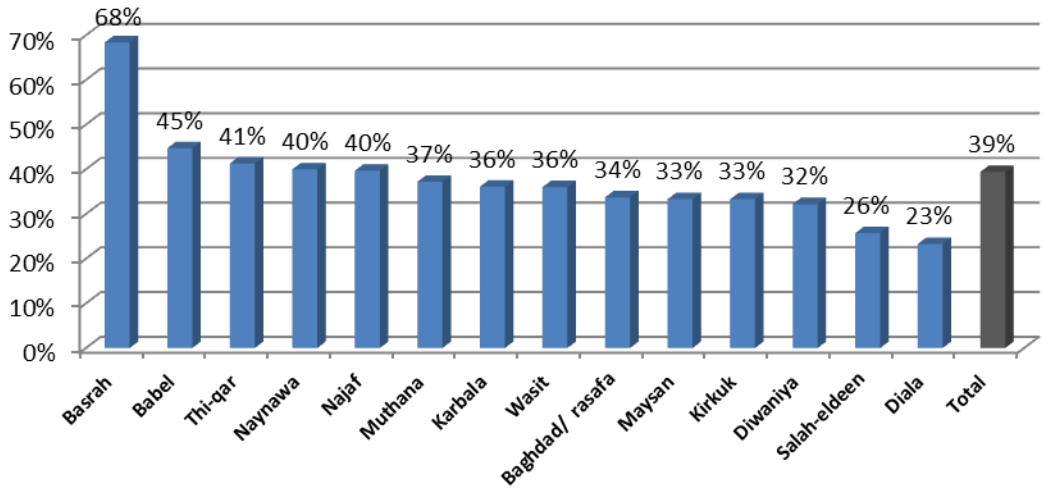


Figure (5): The prevalence of Anemia in pregnant women by governorates.

The highest prevalence of anemia was in Basrah (68.4%) may be because of high prevalence of thalassemia and sickle cell anemia or nutritional anemia.

The highest percentage of anemia in pregnancy was found to occur during the third (3rd) trimester and was (45.3%) while the least percentage was found to occur during the first (1st) trimester and was (28.0%). As in figure (6).

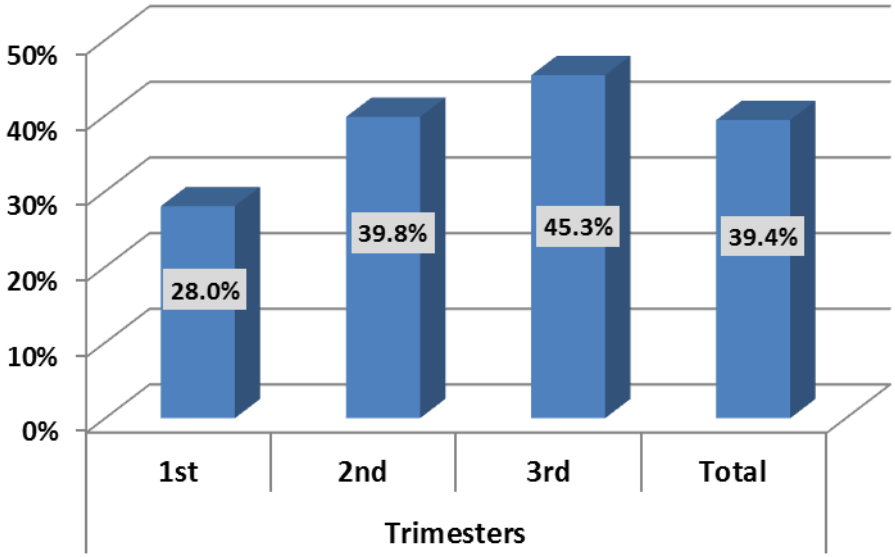


Figure (6): The frequency distribution of hemoglobin level according to the gestational age

Chi-square shows statistical significant association between anemia and gestational age (d.f. =s, x^2=31.481, p value <0.00001), And this agrees with a study done by Milman (2008) who found that the Anemia prevalence was 2.3 times more prevalent at third trimester; The prevalence of anemia at the second trimester is 21.2% increased to

37.5% at the third trimester (9).This might be due to hemodilution but, it might also indicate poor prenatal care. (10)

The highest percentage of anemia was found in those having (5 & more) pregnancies and was (43.5%).While the least percentage of anemia was found in those with (2-4) pregnancies and was (38.2%) as in figure (7). And this agrees with a study done by Yahya et al (2011), they found that in high parity pregnancies carry about three times higher risk of developing incident anemia in pregnancy than low parity pregnancies, and that the risk of anemia in pregnancy increases in a dose response fashion over increasing levels of parity (11). The greater risk of anemia in pregnancy associated with higher parity may be explained by women having high parity pregnancies' increased susceptibility to hemorrhage. In a healthy pregnancy, hormonal changes lead to an increase in plasma volume which causes reduction in hemoglobin level (12).

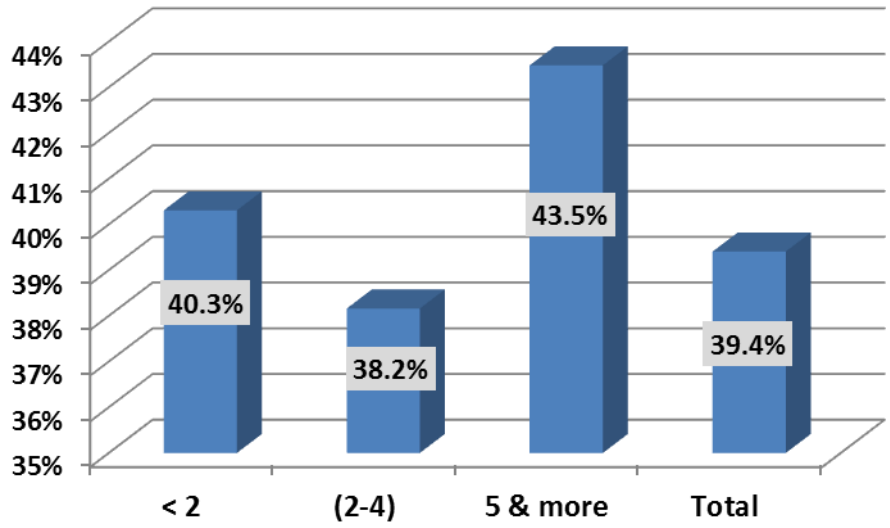


Figure (7): shows the frequency distribution of anemia according to number of pregnancies (parity).

Chi-square shows no statistical significant association between anemia and number of parity (d.f.=1, x^2=.034 , p value=.853).

The prevalence of anemia in those who take the iron folate supplements was (38.8%) whereas the prevalence of anemia in those who don't take the supplements was (40.8%).Chi-square shows no statistical significant association between anemia and the use of iron folate supplements (d.f.=1, x^2=.789 , p value=.375), and this agree with a study done by Paul Preziosi et al (1997) they found , that 42% of cases of anemia in the iron-supplemented group persisted at delivery (compared with 70% in

the placebo group) may be due to Other etiologic factors as Multiple factors affect hemoglobin concentration as nutritional deficiencies, malaria, parasitemia, and sickle cell diseases(13).

The highest percentage of anemia was found in pregnant women with age group less than 18 years and was (46.7%) followed by the age group of more than 40 years old and was (45.0%) , while the least percentage to occur is found in age group between (18-39) years and was (38.3%) as in figure (8). Chi-square results shows statistical significant association between anemia and the maternal age (d.f. =2, x^2=7.589, p value= .022).

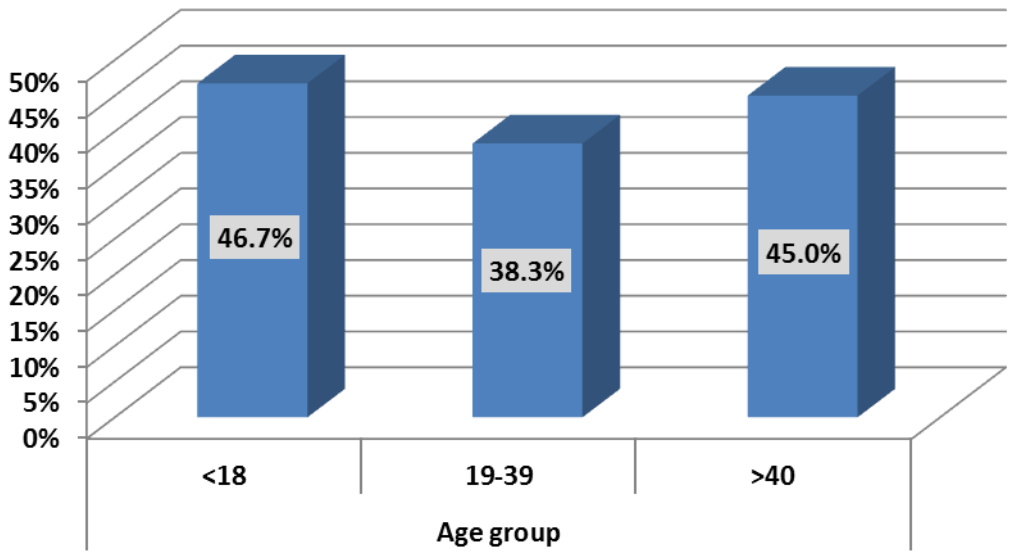


Figure (8) shows the frequency distribution of anemia according to the age group.

The highest percentage of anemia was found in those who are (primary, illiterate, intermediate, read and write) (41.9%, 41.7%, 40.6%, and 38.1%) respectively and the least was found in those who were (diploma, college and more & secondary) (36.6%, 35.5%, 33,3%) respectively . Chi square shows no statistical significant association between anemia and the educational level (d.f.=2, x^2=1.655 , p value=.437)

The highest percentage of anemia in pregnant woman was found in those who are students (45.5%) followed by housewives (39.3%) while the least percentage of anemia was found in the employers and was (37.9%).Chi square shows no statistical association between anemia and the occupation (d.f.=2, x^2=2.000 , p value= .368).

Conclusions:

1. The prevalence of anemia in Iraq found to be moderate according to the classification of the World Health Oranization.
2. There is no clear effect of iron folate supplements on the prevention of anemia during pregnancy may be because of other causes of anemia other than iron deficiency anemia as thalasemia, sickeled cell anemia, and worm and parasites infestation or the compliance of patient to the treatment.
3. There was a great effect of the maternal age on the occurrence of anemia that statistical significance association.
4. Also patients with high parity have high risk of having anemia, but the relation between them is not statistically significantly associated.

Recommendations

1. Encourage the healthy life style and nutrition by ingestion of good and well balanced food rich in iron as meat, liver, green leafy vegetables, and egg.
2. Educate the married woman about spacing between pregnancies at least 2 years between each two consecutive pregnancies, as it associated with less incidence of developing anemia during pregnancy because the mother can regain her health before getting pregnant.
3. Educate the married women about good and regular anti-natal visits, and educate the health care centers for regular hemoglobin measurement for each visit of the pregnant lady to catch the anemia as early as possible and avoid the bad and poor consequences and outcome.

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Annexes

Annex (1): The Questioner used in Anemia surveillance system in pregnant women.

وزارة الصحة

دائرة الصحة العامة

معهد بحوث التغذية

نظام الترصد التغذوي للنساء الحوامل

S1: دائرة صحة: ..... S2 : اسم القطاع : ..... S3 : اسم المركز الصحي : .....

S4: رقم الاستمارة: ☐☐☐☐ S5: تاريخ الزيارة: ☐☐ / ☐☐ / 2 0 1 ☐

S6: عدد الزيارات الكلي: ☐☐

المعلومات الشخصية :

S7: العمر: ☐☐ سنة S8: تاريخ الميلاد: ☐☐ / ☐☐ / ☐☐☐☐

S9: التعليم: 1- تقرأ و تكتب 2- أبتدائية 3- متوسطة 4- اعدادية 5- معهد 6- كلية فأكثر

S10: المهنة: .....

تاريخ الاحمال و الولادات :

S11: عدد الاحمال الكلي:* ☐☐ S12: عدد الاحمال التي انتهت بولادة حية: ☐☐

S13: عدد الاحمال التي انتهت بولادة ميتة: ☐☐ S14: مجموع الاسقاطات و الاجهاضات: ☐☐

S15: عدد أشهر الحمل الحالي: ☐☐

S16: هل تناولت مقويات كالحديد والفوليت خلال اشهر حملك ؟ 1- نعم 2- كلا

S17: اذا كان الجواب (نعم) فهل تأخذينها: 1- بشكل منتظم 2- بشكل غير منتظم

S18: اذا كان الجواب (كلا) فما هو السبب؟ 1- غير متوفرة 2- لم توصف من قبل الطبيبة 3- الاضرار الجانبية

نتيجة الفحوصات المختبرية :

S19: نتيجة فحص الهيموكلوبين (غم/دل) بجهاز الهيموكيو :

Hb: ☐☐.☐ gm/dL

اسم منظم الاستمارة : ..... التوقيع : .....

S10 = S11 + S12 + S13*