The Prevalence of Iron Deficiency Anemia among Pregnant Women in Ibn-Albaldy Hospital

إنتشار فقر الدم الناتج عن نقص الحديد بين النساء الحوامل في مستشفى إبن البلدي

Abeer A. Gatea, Msc. *
Wafaa F. Tawfeeq, PhD, FICMS **
Muna R. Hassan, PhD, D.G.O***

* Assistant instructor, Al-Rusafa Health Office, Ministry of Health
** Assistant professor, Department of community health, collage of Health and Medical Technologies, Baghdad
*** Assistant instructor, Al-Rusafa Health Office, Ministry of Health

المستخلص:

الهدف : دراسة مدى انتشار فقر الدم الناتج عن نقص الحديد لدى النساء الحوامل ومعرفة درجة فقر الدم ووجود اي ارتباط بين الخصائص الديموغرافية ودرجة فقر الدم.

المنهجية : اجريت دراسة مقطعية في مستشفى ابن البلدي في بغداد على عينة بالغة ٢٥٨ امرأة حامل ممن راجعن العيادات الخارجية للفترة من الاول من اذار ٢٠١١ ولغاية الخامس عشر من تشرين الاول ٢٠١١ . جمع البيانات كان من خلال استبيان معد مسبقا" يتضمن المعلومات السكانية وتاريخ التولد. تم اخذ عينه من الدم من كل مشاركة لقياس نسبة الهيموغلوبين ،معدل حجم كريات الدم الحمر ،نسبة الحديد وقابلية ارتباط الحديد الكلي.

النتائج : الفئة العمرية الاكثر تكرارا" كانت ٢٠-٢٩ سنة ١٠١ (٣٩٠٢%) . فقر الدم المعتدل موجود لدى ١٠٠ (٣٨٠٨%) من العينة والشديد لدى ٥٥ (٢١٠٣%). معدل نسبة الهيموغلوبين كان ٩,٢ ± ٣,٥، حجم الكريات الحمر ١٠٩ ± ٢٦,١ معدل الفرتين في المصل ٤٨,٧ ± ٤٦٠٦ ومعدل الحديد ١٠٤ ± ٦٢ ومعدل ارتباط الحديد الكلي ٤٥٨ ± ٩١. وجود علاقة ذات مغزى معنوي بين العمر والمستوى التعليمي من جهة ودرجة فقر الدم.

التوصيات: اتخاذ الاجراءات التي تساعد على اخذ الامهات غذاء غني بالحديد وتناول ادوية الحديد الخاصة بالحوامل.

Abstract

Objectives: To study the prevalence of iron deficiency anemia in pregnant women and to find out the degree of iron deficiency anemia and to find out any association this has been found between the socio- demographic characteristics and the degree of iron deficiency anemia.

Methodology: A cross sectional study has been conducted in Ibn-Albaldy hospital in Baghdad among 258 pregnant women attending outpatient clinics during the period from the 1st of March 2011 to fifteenth of October 2011. Data collection was by using a previously designed questionnaire including socio-demographic characteristics, obstetrical history. A blood sample has been obtained to estimate the hemoglobin, mean corpuscular volume, serum iron and iron binding capacity.

Results: The most frequent age group was 20-29 years 101(39.2%). Moderate degree anemia found in 100(38.8%), severe anemia in 55(21.3%), mean hemoglobin was 9.2 ±3.5 SD, mean corpuscular volume 109 ±26.1 SD, mean serum feritin 48.7 ± 46.6 SD, mean serum iron 104 ±62SD and total iron binding capacity 458 ± 91. Significant association has been found between degree of anemia and age and educational level.

Recommendation: Interventions to enhance the intake of diet rich in iron and the intake of iron supplements for all pregnant women.

Keywords: prevalence, iron deficiency, anemia, iron supplements, pregnancy

Introduction:

Iron deficiency anemia (IDA) is the most common and primary cause of anemia [1]. It is regarded as one of the main health indicators [2]. Risk factors for iron deficiency anemia among pregnant women identified in past studies included parasite infestation, food habits, gestational age, parity, early age at the time of marriage and geographic location [3].The first stage of ID involves the depletion of tissue iron stores [4]. In the absence of inflammation, the level of serum ferritin, an iron storage protein, has been shown to be a sensitive and reliable biomarker of the body iron store [5].Anemia in pregnancy is defined by the World Health Organization as a hemoglobin value below 11 g/dl [6,7]. Although anemia is frequently graded as "mild", "moderate", or "severe", or very severe, the hemoglobin values at which the division into these four categories is made vary and are arbitrary [7]. Standardized cut-off values are difficult to define because populations, geographic settings and needs are different according to specific areas. Some authors suggest that hemoglobin values at sea level should be categorized as follows [8]: (1) mild anemia (Hb 9 to 11 g/dl); (2) moderate anemia (Hb 7 to 8.9 g/dl); (3) severe anemia (Hb 4-6.9g/dl); (4) very severe anemia <4 g/dl.

However, other criteria have been widely used in the literature to define anemia cut-off values: (1) mild (Hb 9 to 10.9 g/dl), (2) moderate (Hb 7 to 8.9 g/dl) and (3) severe (Hb below 7 g/dl) (Adam 2005); and (1) mild anemia (Hb 7 to 11 g/dl), moderate anemia (5 to 6.9 g/dl) and severe anemia (below 5 g/dl) [9].

Hemoglobin estimation and study of peripheral smear is good indicator for diagnosis of anemia. There may be several methods for estimation of Hb. Other special laboratory investigations total iron binding capacity (TIBC), serum feritin (SF) [10]. **Objectives : -** to study the prevalence of IDA among a sample of pregnant women in Ibn Albaldy hospital and to find out the degree of IDA among the studied sample and to find out any association between socio demographic characteristic and the degree of IDA.

Methodology:

This cross _sectional study has been conducted in Ibn- Albaldy hospital. The study period extended from 1/3/2011to 15/10/2011.A non-probability convenient sample of pregnant women attending outpatient's clinic of Ibn Albaldy hospital. A detailed physical examination was conducted on all the participants. Blood samples were obtained. Serum iron and total iron binding capacity levels were measured using a commercially available kit. The hemoglobin (Hb) and mean corpuscular volumes (MCV) were analyzed on the cell counter. The concentration levels of serum ferritin were measured using radio-immunoassay.

The criteria for IDA were Hb < 11 g/dL, MCV < 78 µm3, serum ferritin < 12 ng/ml or TS < 15%. Serum iron levels may be measured directly in the blood, but these levels increase immediately with iron supplementation, and pure blood serum iron concentration in any case is not as sensitive as a combination of total serum iron, along with a measure of the serum iron-binding protein levels (total iron binding capacity or TIBC). The ratio of serum iron to TIBC (called iron saturation or transferring saturation index or percent) is the most specific indicator of iron deficiency, when it is sufficiently low. The statistical analysis was performed using the Statistical Package for the Social Sciences version 13(SPSS Inc, Chicago, IL, USA) [11].

A questionnaire was completed for each pregnant women including basic socio demographic, and reproductive data. Age, Age at first pregnancy, Education (illiterate, read and write, primary, intermediate, secondary, university) Stage of pregnancy 1-First (1 to 12 weeks) 2-Second (13-28weeks)Third(29-40weeks)[12], Number of pregnancies, Spacing (Birth Spacing refers to the time interval from one child's birth date until the next child's birth date)[13], Birth weight of last baby in (kgs) ,Smoking habits(current smoker ,previous smoker, non-smoker, passive smoker) [14] , History of health problem (diabetes, hypertension, and heart disease) from the medical records of the patients ,Previous use of iron supplements before pregnancy, Current use of iron supplements during pregnancy, Classification of anemia[15],Pre pregnancy

weight(Kg),Family size, Number of antenatal visits, Investigation ,Hemoglobin; mean corpuscular Volumes; total iron binding capacity and transferring saturation.

Results:

Table 1. Distribution of studied sample of pregnant women according to age, occupation, education, classification and family size (n = 258)

Variables		f	%
Age/ years	<20	24	9.3%
	20-29	101	39.2%
	30-39	90	34.9%
	40-50	43	16.6%
Occupation	employed	100	38.8%
	Non employed	158	61.2%
Education	Illiterate	53	20.5%
	Read & write	49	19%
	Primary	61	23.6%
	Intermediate	33	12.8%
	Secondary	50	19.4%
	University & higher	12	4.7%
Classification	Normal (>11gm)	38	14.7%
	Mild (9-10.9gm)	46	17.8%
	Moderate (7-8.9gm)	100	38.8%
	Severe (4-6.9gm)	55	21.3%
	Very severe (<4gm)	19	7.4%
Family size	2	22	8.5%
	3-5	110	42.6%
	6-9	51	19.8%
	≥10	75	29.1%

Gm=gram; f =frequency; %=percent

Table 1. shows that the higher percent 101(39.2%) falls in the age group (20-29) years, followed by 90(34.9%) in the age group (30-39) years, and the least frequency 24(9.3%) in the age group (<20) years old. Regarding the occupation the majority of pregnant 158 (61.2%) was not employed and 100 cases (38.8%) were employed. The table also shows the education level, the highest frequency of pregnant women were primary education 61(23.6%), 53(20.5%) were illiterate education, followed by 50(19.4%) were secondary education and only 12(4.7%) were university and higher education. Majority of pregnant women presented with moderate anemia 100(38.8%), 55(21.3%) with severe anemia, while 46(17.8%) with mild anemia.

Table 2. Distribution of studied sample according to stage of pregnancy, previous and current use of iron and number of antenatal visits (n= 258)

Stage of pregnancy	f	%
1st trimester	70	27.1%
2nd trimester	130	50.4%
3rd trimester	58	22.5%
Previous use of iron		
Yes	207	80.2%
No	51	19.8%
Current use of iron		
Yes	242	93.8%
No	16	6.2%
Antenatal visits		
1	51	19.8%
2	47	18.2%
3	35	13.6%
>4	125	48.4%

f: frequency; %: percent,≥=greater than or equal

The results of table (2) shows that the prevalence of anemia was the highest among pregnant women in 2nd trimester 130(50.4%) compared to those in the 1st trimester 70(27.1%) and 3rd trimester 58 (22.5%). Also in this table more than half of cases 207(80.2%) took iron before pregnancy while 51(19.8%) of cases were not. Majority of cases 242 (93.8%) had current use of iron while 16(6.2%) had not. Regarding antenatal visits, the number of cases with >4 visits were 125(48.4%), followed 51(19.8%), 47(18.2 %), 35(13.6%) in one, two, and three visits, respectively.

Table 3. Indices of the iron status of the participants (n=258)

Variables	Mean	SD	50th percentile
Hb(normal >11 g/dL)	9.2	3.5	9.3
MCV(normal >78 µm3)	109	26.1	105
Ferritin (normal 15-150 µg/L)	48.7	46.6	39
Serum iron(normal 50–170 µg/dL)	104	62	102
TIBC(normal 250–370 µg/dL)	458	91	450
TS (normal 15–50%)	22.7	12.9	22.2

SD: standard deviation; Hb: hemoglobin; MCV: mean corpuscular Volumes; TIBC: total iron binding capacity; TS: transferring saturation; µg/dL: mailgram / deciliter; µg/L: mail gram / liter; µm: mail meter, m%: percent

Table (3)   in this table the mean ± sd and 50th percentile of Hb was (9.2±3.5)(9.3),MCVwas(109±26.1)(105, serum ferritin(48.7± 46.6)(39), serum iron (104± 62)(102), and TIBC (458± 91)(450).

Table 4. Distribution of studied sample of pregnant women according to age, occupation, education by state of anemia (n = 258)

Variables	State of anemia										Total		p. value
	None >11 g/dl		Mild 9-10.9 g/dl		Moderate 7-8.9 g/dl		Severe 4-6.9 g/dl		Very severe < 4 g/dl				
Age	f	%	f	%	f	%	f	%	f	%	f	%	
<20	4	16.6%	11	45.8%	7	29.2%	1	4.2%	1	4.2%	24	100%	0.000
20-29	13	12.9%	18	17.8%	54	53.5%	13	12.9%	3	2.9%	101	100%	
30-39	11	12.2%	10	11.1%	29	32.2%	31	34.5%	9	10%	90	100%	
40-50	10	23.3%	7	16.2%	10	23.3%	10	23.3%	6	13.9%	43	100%	
Occupation													
Employed	17	17%	19	19%	35	35%	22	22%	7	7%	100	100%	0.851
Non employed	21	13.3%	27	17.1%	65	41.1%	33	20.9%	12	7.6%	158	100%	
Education													
Illiterate	3	5.7%	9	17%	22	41.5%	18	34%	1	1.8%	53	100%	0.004
Read & write	10	20.4%	6	12.2%	22	44.9%	9	18.4%	2	4.1%	49	100%	
Primary	7	11.5%	18	29.4%	22	36.1%	7	11.5%	7	11.5%	61	100%	
Intermediate	7	21.2%	4	12.1%	10	30.3%	10	30.3%	2	6.1%	33	100%	
Secondary	5	10%	7	14%	22	44%	10	20%	6	12%	50	100%	
University & higher	6	50%	2	16.7%	2	16.7%	1	8.3%	1	8.3%	12	100%	

P: probability level, F: Frequency, %: percent, >=greater than, <=less than

Table (4) presented that in the age group (20-29) years, 54 (53.5%) had moderate anemia, followed by 18(17.8%) had mild anemia, and 13(12.9%) for each normal and severe anemia, while only 3(2.9%) had very severe anemia. In the age group (30-39) years old, 31(34.5%) had severe anemia, 29(32.2%) had moderate anemia, followed by 11(12.2%) had normal, 10(11.1%) had mild anemia, while only 9(10%) had very severe anemia. In the age 40-50 years old, 10(23.3%) for each of moderate and severe anemia, also 7(16.2%) had mild anemia and 6(13.9%) had very severe anemia .In the age <20 years old, 11(45.8%) of cases had mild anemia, 7(29.2%) had moderate and 4(16.6%) had normal, only 1(4.2%) for each severe and very severe anemia. Significant associations have been found between the age and state of anemia (p.value=0.000). Regarding occupation, in employed group 35(35%) of pregnant women had moderate anemia, followed by 22(22%) had severe anemia, 19(19%) had mild anemia and 17(17%) had normal. While in non-employed group, 65(41.1%) had moderate anemia, 33(20.9%) had severe anemia, 27(17.1%) had mild anemia, while only 12(7.6%) had very severe anemia. No significant associations have been found between occupation and state of anemia (p.value=0.851).In the primary education,22(36.1%)of cases had moderate anemia, 18(29.4%) of cases had mild anemia, followed by 7(11.5%) had severe and very severe anemia, in the illiterate level, 22(41.5%) of cases had moderate anemia, 18(34%) had severe anemia, 9(17%) had mild anemia and only 1(1.8%) had very severe anemia. In secondary level of education, 22(44%) of cases had moderate anemia, 10(20%) had severe anemia, followed by 7(14%) had mild anemia and 6(12%) had very

severe anemia. In the read and write level of education, 22(44.9%) of cases had moderate anemia, 10(20.4%) had normal anemia, and 9(18.4%) had severe anemia, while only 2(4.1%) had very severe anemia. In intermediate level of education, 10(30.3%) of cases had moderate and severe anemia, 4(12.1%) had mild anemia and only 2(6.1%) had very severe anemia. In university level of education, 6(50%) of cases had normal, 2(16.7%) for each of mild &moderate anemia and 1(8.3%) for each of severe and very severe anemia. Significant associations have been found between the education level and state of anemia (p. value =0.004).

Table 5. Distribution of studied sample of pregnant women according to stage of pregnancy, previous and current use of iron and number of antenatal visits by state of anemia (n= 258)

Variables	State of anemia										Total		p. value
	None >11 g/dl		Mild 9-10.9 g/dl		Moderate 7-8.9 g/dl		Severe 4-6.9 g/dl		Very severe <4 g/dl				
Stage of pregnancy	f	%	f	%	f	%	f	%	f	%	f	%	
1st trimester	11	15.7%	8	11.4%	26	37.1%	16	22.9%	9	12.9%	70	100%	
2nd trimester	15	11.5%	17	13.1%	63	48.5%	29	22.3%	6	4.6%	130	100%	0.000
3rd trimester	12	20.7%	21	36.2%	11	19%	10	17.2%	4	6.9%	58	100%	
Previous use of iron													
Yes	29	14%	33	16%	92	44.4%	40	19.3%	13	6.3%	207	100%	0.005
No	9	17.7%	13	25.5%	8	15.7%	15	29.4%	6	11.7%	51	100%	
Current use of iron													0.139
Yes	36	14.9%	41	17%	98	40.5%	49	20.2%	18	7.4%	242	100%	
No	2	12.5%	5	31.2%	2	12.5%	6	37.5%	1	6.3%	16	100%	
Antenatal visits													
1	4	7.8%	10	19.6%	17	33.3%	18	35.3%	2	4%	51	100%	
2	7	14.9%	5	10.6%	8	17%	25	53.2%	2	4.3%	47	100%	0.000
3	10	28.6%	9	25.7%	13	37.1%	2	5.7%	1	2.9%	35	100%	
>4	17	13.6%	22	17.6%	62	49.6%	10	8%	14	11.2%	125	100%	

P: probability level, F: Frequency, %: percent, >=greater than, <=less than

Table (5) shows that in 1st trimester, 26(37.1%) of cases had moderate anemia, 16(22.9%) had severe anemia, followed by 11(15.7%) had normal, and 9(12.9%) had very severe anemia. While in 2nd trimester, 63(48.5%) of cases had moderate anemia, 29(22.3%) had severe anemia, and17 (13.1%) had mild anemia, while only 6(4.6%) of cases had very severe anemia. In the 3rd trimester, 21(36.2%) of cases had mild anemia, 11(19%) of cases had moderate anemia and 10(17.2%) of cases had severe anemia, only 4(6.9%) of cases had very severe anemia. Significant associations have been found between the stage of pregnancy and state of anemia (p. value =0.000). In iron use before pregnancy, 92(44.4%) of cases had moderate anemia, followed by 40(19.3%) had severe anemia,

33(16%) had mild anemia, 13(6.3 had very severe anemia, while those not using iron, 15(29.4%) had severe anemia, 13(25.5%) had mild anemia, followed by 9(17.7%) of cases had no anemia, 8(15.7%) had moderate anemia. Significant associations have been found between the previous use of iron and state of anemia (p. value =0.005).In current use of iron, 98(40.5%) of cases had moderate anemia, 49(20.2%) had severe anemia, 41(17%) had mild anemia, and 18(7.4%) had very severe anemia. While in cases of not using iron, 6(37.5%) of cases had severe anemia,5(31.2%) had mild anemia,2(12.5%)had normal and moderate anemic, while 1(6.3%) of cases had very severe anemic. No significant association have been found between current use of iron and state of anemia (p.value=0.139). Regarding the antenatal visits, in those with one visit, 18(35.3%) of cases had severe anemia, 17(33.3%) of cases had moderate anemia, followed by 10(19.6%) had mild anemia and 2(4%) had very severe anemia. In those with two visits, 25(53.2%) of cases had severe anemia, 8(17%) had moderate anemia, 7(14.9%) had no anemia, and 2(4%) had very severe anemia. In those with three visits, 13(37.1%) of cases had moderate anemia, 10(28.6%) of cases had normal, 9(25.7%) had mild anemia, and 1(2.9%) of cases had very severe anemia. In those with four visits and more, 62(49.6%) of cases had moderate anemia, followed by 22(17.6%) of cases had mild anemia, 14(11.2%) of cases had very severe anemia, and 10(8%) of cases had severe anemia, with significant association between number of antenatal visits and the state of anemia (p.value=0.000).

Discussion:

Iron deficiency anemia during pregnancy is a very common and preventable problem. It remains a major contributing factor to maternal morbidity and mortality [16]. In the present study, 39.2% of cases with anemia were in the age group of 20-29 years ,this result is lower than that found by Lama in Jordan [17]. 43 % were in age group 20-30 and by Hanmanta 2010 in Solapur [18]. 86.9% of cases were in the age group of 20-29 years , this may be due to differences in nutritional habits in developing countries. In this study, 61.2% of pregnant were non employed , higher percentage found in Saudi by saad[1]. 82.6 % and 74.8% in Multan by Taseer 2011[19],indicates that there are differences in the level of education and cultural between the countries .Education has an influence on anemia through knowledge on health, socioeconomic status, and occupation. In this study, 23.6% of cases were of primary education level, but lower results were found in Saudi by saad[1] 17.4%, this difference is due to the deterioration of the situation in Iraq because of the war .In the present study 38.8% of pregnant women had moderate anemia and 21.3% had severe

anemia, a study from India [8] has reported moderate anemia in 61% of the cases, this higher result may different dietary habits among countries. In this study 42.6% of cases were family size (3-5) compared with other study in Jordan found by Lama [17]18.8%, this indicates that there are difference in the habits and the living level between the two countries. The prevalence of iron-deficiency anemia was lowest in the first trimester of pregnancy owing to lower iron demand compared with that of the second and third trimesters. In present study, 50.4 % were in 2nd trimester and 27.1% in the 3rd trimester, a study from Pakistan[20] has reported the prevalence of anemia to be 54% in 3rd trimester, also in Jordan by lama [17] 2011, 49.4% in 3rd trimester, high frequency of anemia patients in 3rd trimester may be due to increase demand of micronutrients during the period in the back ground of poor dietary habits .The intake of iron pills is a factor tending to reduce the risk of iron-deficiency anemia in the tropics. This study showed a correlation between the intake of iron-pills and iron-deficiency anemia, although this correlation was weak - this may be due to

low maternal compliance, and the sample size restrictions. In this study, 80.2 % of pregnant women were previous use of iron supplements, compare with other results in Nigerian by Ugwuja, 2010[21] 46.3% and in Vietnam by Ritsuko [22] 54.9 % and in Iran by Fatemeh [23] 91%. This indicates to increased awareness programs about use of iron supplementation. In this study the mean level was Hb (9.2 ± 3.5) and mean corpuscular volume (MCV) 109 ± 26.1 , another study done in Algeria by Demmouche [24], found the mean Hb level to be Hb 9.00 ± 1.57 g/dl; and MCV 75.7 ± 10.4 fl. These results higher than the standard value of 78, this may indicate low dietary intake.

Recommendations:

Interventions to enhance the intake of diet rich in iron and the intake of iron supplements for all pregnant women**.**

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