ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com
Journal DOI: 10.21474/IJAR01

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

IRON DEFICIENCY ANAEMIA DURING PREGNANCY IN QUALIOBEYA.

Galal Ahmed El-Kholey, Seham Abdel-Haleem Ahmed El-Berry, Ahmed MoustafaSadek,Amira Ibrahim Mansour,Amany Mohamed El-Sayed .

Manuscript Info

Manuscript History:

Received: 14 April 2016
Final Accepted: 19 May 2016
Published Online: June 2016

Key words:
anemia, iron deficiency anemia, serum ferritin, hemoglobin.

Corresponding Author

Galal Ahmed El-Kholey.

Abstract

Objectives:-In this study**,** our goal was to determinethe prevalence of iron deficiency anemia and pregnancy outcome among pregnant women.

Methods:- This study was based onthat all participated women(n=500) will be subjected to CBC analysis and serum ferritin level in order to diagnose iron deficiency anemia and follow up until delivery.

Results:- ,232 of cases of totalparticipated women were anaemic and the estimated prevalence of iron deficiency anaemia was 46.4% with the mean haemoglobin concentration of anaemic cases (232) 10.8 ± 1.19 (range7.2-12.7gm/dl), the mean of serum ferritin16.59 ± 11.03 (range 3.57-56.9).Anemic pregnant women were at higher risk of postpartum bleeding (11.95%), increased caesarian delivery (39.65%), preterm delivery (<37 weeks),low birth weight(24.34%) and high rate of abnormal Apgar score(15.86%).

Conclusion:- the prevalence of iron deficiency anemia among pregnant women attending the outpatient antenatal clinic at Banha University Hospital was found to be 46.4% and it affects the maternal and fetal outcome when accompanied with other factors.

Introduction:-

Anaemia is decreased ability of the red blood cells to provide adequate oxygen to body tissues. It may be due to a decreased number of red blood cells, a decreased amount of substance in red blood cells which transport oxygen (haemoglobin) or a decreased volume of red blood cells themselves. The World Health Organization defined anemia in pregnancy as haemoglobin concentration of less than 11 g/dl**. (1)** Iron deficiency anemia is one of the leading risk factors for disability and death worldwide, affecting an estimate of two billion people**.(1)** Anemia is one of the main nutritional deficiency disorders affecting a large proportion of the population, not only in developing but also in industrialized countries.Nutritional iron deficiency anemia arises where physiological requirements cannot be met by iron absorption from diet. Low iron bioavailability in populations consuming monotonous plant-based diets is other factor for iron deficiency anemia**. (1).**Prevalence of anaemia among population is commonly used through determination of HB, and cut-off levels of HB has been set by WHO. The 2004 joint WHO/CDC technical consultation supposed the use of serum ferritin as an indicator of iron depleted iron stores and as an assessment of iron intervention programmes.**(2).** iron supplementation had a protective effect on adverse pregnancy outcome. On the other hand, severe maternal anaemia, particularly in the first trimester, is associated with adverse outcomes, namely, preterm birth, low birth weight, intrauterine growth restriction, low Apgar score, and operative deliveries**.(3)**

Methodology:-

The current study is conducted at Banha University Hospital during the period between April 2015 and December 2015, to study the frequency of iron deficiency anemia and pregnancy outcome among pregnant women in Qualiobeyagovernerate.The current study included (500) pregnant womenwith uncomplicated singleton pregnancy at first, second or third trimester of pregnancy,no medicaldisorders,noheamoglobinopathes among those attending

the outpatient antenatal clinic atBanha University Hospital. We excludepregnant women withhistory of chronic medical diseases such as chronic heart disease,T.B, HTN and diabetes,history of ante partum hemorrhage, threatened abortion, multiple pregnancies, bleeding disorders and smokers.Data will be collected as regard to their age, parity, educational level and occupation. All participants will be subjected to Complete blood count with peripheral smear by cell counter(5ml of venous blood,1ml on edta for complete blood count and 4ml in a plain tube is centrifuged and serum is stored at -20)andserum ferritin by enzyme immunoassay.All cases are followed up at ANC Clinic till delivery to assess maternal outcomeas regards vital signs, uterine contractility,vaginal bleeding and any blood transfusion if indicated. Also all cases are followed up at ANC Clinic till delivery to assess neonatal outcome as regards as Apgar score at 1&5 minutes, birth weight, head circumference, congenital anomalies if found and admission to the NICU if needed.

Results:-

The study sample composed of 500 pregnant women among those attending the ANC clinic. The cases followed all through pregnancy were 460 cases and there were 5 cases aborted and 35 cases were not followed in the study all through pregnancy. The results show that(67.6%) of cases were ≥25 yrs, (70.8%) had BMI >20(Kg/m^2), (96.8%) were not employed,(77.2%) of cases from rural, (22.8%) from urban, (62.8%) of cases with inadequate dietary intake.(11.4%) of pregnant women were in the 1st trimester , (12.6%) of pregnant women were in the 2nd trimester , (76.0%) of pregnant women were in the 3rd trimester, (16.8%) primigravidae,(83.2%) multigravida,(94.24%) of cases were multiparae, inter pregnancy periods range between(1-9),(71.6%) had no abortions,(32.8%) had no contraception,(98.8%) had regular menstruation and (73.2%) had folic acid supplement.Hematological indices of the studied group show that the mean ± SD of hemoglobin was(10.8 ± 1.19)&its range was(7.2-12.7) and the mean ± SD of mean corpuscular volume was(78.9 ± 8.49) and the mean ± SD of serum ferritin was(16.59 ± 11.03). The results show that 60.44% of the cases delivered by normal vaginal delivery, (39.56%) delivered by cesarean section with (11.95%) had postpartum hemorrhage, (88.05%) of cases had no complications, (24.34%) with fetal low birth weight, (15.86%) abnormal Apgar score and only (17.39%) had admitted to NICU.

Table 1:- Clinico-epidemiological data of thestudied group:(n=500)

Variable	**(n=500)**	
Age (year):- Range	16-40	
< 25 yrs	162 (32.4%)	
≥25 yrs	338 (67.6%)	
Mean ± SD	27.99 ± 6.3	
Weight (Kg):- Range	62.00-102.00	
<70kg	135(27%)	
>70kg	365(73%)	
Mean ± SD	74.33±4.88	
Height(cm):- Range	158.00-176.00	
Mean ± SD	163.89±8.92	
BMI(Kg/m^2): Range	17.81-32.91	
<20	146(29.2%)	
>20	354(70.8%)	
Mean ± SD	21.82±7.94	
Variable	**No**	**%**
Employment:- Not working	484	96.8
Working	16	3.2
Diet: Adequate	186	37.2
Inadequate	314	62.8
Residence:- Rural	386	77.2
Urban	114	22.8

Table 2:- Obstetric history of the studied group (n=500).

Variable	(n=500)	
	N	%
Gestational age at booking (weeks):		
1st trimester	57	11.4
2nd trimester	63	12.6
3rd trimester	380	76.0
Range	5-41	
Mean ± SD	32.03± 10.76	
Gravidity(n=500):		
Primigravidae	84	16.8
Multigravidae	416	83.2
Range	1-8	
Mean ± SD	3.08±1.66	
Parity(n=416):		
Nulliparae	24	5.76
Multiparae	392	94.24
Range	0-7	
Mean ± SD	2.11±1.33	
Inter pregnancy space(n=392):		
Range	1 – 9	
Mean ± SD	2.58 ± 1.26	
History of miscarriage(n=416):		
No	298	71.6
Yes	118	28.4
Range	1-4	
Mean ± SD	1.49 ± 0.81	
Contraception:		
No	164	32.8
Pills	158	31.6
IUD	166	33.2
Both	12	2.4
Complication at first pregnancy(postpartum hemorrhage, pre-eclampcia)(n=410)		
No	368	89.8
Yes	42	10.2
Folic acid supplement:		
No	134	26.8
Yes	366	73.2
Menstrual history:		
Irregular	6	1.2
Regular	494	98.8
Inter-menstrual bleeding:		
No	488	97.6
Yes	12	2.4

Table 3:- Laboratory investigation of the studied group (n=500).

Variable	(n=500)
Hb%(gm/dl):	
Range	7.2-12.7
Mean ± SD	10.8 ± 1.19
HCT%:	
Range	22.9-41.7
Mean ± SD	32.25 ± 3.24
MCH(fl):	
Range	17.5-75.1
Mean ± SD	28.04 ± 8.05
MCV(pg):	
Range	26.9-91.5
Mean ± SD	78.9 ± 8.49
MCHC(gm/dl):	
Range	29.3-35.7
Mean ± SD	33.45 ± 1.45
Serum ferritin(ug/l):	(n=222)
Range	3.57-56.9
Mean ± SD	16.59 ± 11.03

Table 4:- Prevalence of iron deficiency anemia among the studied group according to Gestational age (n=500).

	1st trimester	**2nd trimester**	**3rd trimester**	**Chi-square test**	
	N=57	**N=63**	**N=380**	**X^2**	**P-value**
Anemia	18 (31.6%)	31 (48.2%)	183 (49.2%)	5.706	0.058
Anemic	39 (68.4%)	32 (51.8%)	197 (50.8%)		
Non anemic					

Table 5:- Relation between Clinico-epidemiological data of the studied group and iron deficiency anemia (n=500).

Variable	**Non anemic (n=268)**		**Anemic (n=232)**		**t**	**P**
Age(years):						
< 25 yrs	94 (35.1%)		68 (29.3%)		1.886	0.017*
≥25 yrs	174 (64.9%)		164 (70.7%)			
Weight (Kg):						
>70	80 (29.85%)		55(23.71%)			
<70	188 (70.155)		177(76.29%)		1.65	0.182
BMI(Kg/m):						
>20	66(24.63%)		80(34.48%)			
<20	202(75.37%)		152(65.52%)		1.76	0.15
Variable	**No**	**%**	**No**	**%**	**χ^2**	**P**
Employment:						
Not working	262	97.8	222	95.7	1.72	0.19
Working	6	2.2	10	4.3		NS
Residence						
Rural	206	76.86	180	77.58	40.24	**<0.001****
Urban	62	23.14	52	22.42		
Diet:						
Inadequate	116	43.3	70	30.2	**42.23**	**<0.001****
adequate	152	56.7	162	69.8		

Table 6:- Relation between obstetric history of the studied group and iron deficiency anemia (n=500).

Variable	Non anemic (n=268)		Anemic (n=232)		χ^2	P
	No	%	No	%		
Gravidity(n=500):						
Primigravida	52	19.4	32	13.8		
Multigravida	216	80.6	200	86.2	2.84	**0.024***
Range	1-8		1-6		**MW**	
Mean ± SD	3.32 ± 1.91		2.81 ± 1.25		**3.29**	**0.01***
Parity:						
Range	2.39 ± 1.55		1.81 ± 0.95		**MW**	**0.02***
Mean ± SD	0 – 7		0 - 4		**2.62**	
Inter pregnancy space(n=392):					MW	0.002 *
Range	1-9		1-6.5		1.18	
Mean ± SD	2.64 ± 1.3		2.51 ± 1.22			
History of miscarriage:	(n=216)		(n=200)			
No	150	71.6	148	74	1.06	0.30
Yes	66	28.4	52	26		NS
Range					MW	
Mean ± SD	1-4		1-3		1.35	0.18 NS
	1.61 ± 0.92		1.35 ± 0.62			
Contraception:						
No	106	39.6	58	25		
Pills	88	32.8	70	30.2	**27.6**	**<0.001****
IUD	74	27.6	92	39.7		
Both	0	0	12	5.2		
Complication of 1st pregnancy:	(n=210)		(n=200)			
No	186	88.6	182	91	**23.8**	**<0.001****
Yes	24	11.5	18	9		
Menstrual history:						
Irregular	6	2.2	0	0	**5.26**	**0.02***
Regular	262	97.8	232	100		
Inter-menstrual bleeding:						
No	262	97.8	226	97.4	0.06	0.80
Yes	6	2.2	2.6	2.6		NS

Table 7:- Relation between Laboratory investigations of the studied group and iron deficiency anemia (n=500).

Variable	Non anemic (n=268)	Anemic (n=232)	Test	P
Hb%(gm/dl):			t	
Mean ± SD	11.68 ± 0.58	9.77 ± 0.85	29.58	**<0.001****
Range	10.4 – 12.7	7.2 - 11		
HCT%:			t	
Mean ± SD	34.37 ± 1.96	29.8 ± 2.64	22.13	**<0.001****
Range	30.4 – 41.7	22.9 – 35.5		
MCV(pg):			t	
Mean ± SD	81.38 ± 4.52	76.04 ± 10.8	7.38	**<0.001****
Range	72.5 – 91.5	26.9 – 89.9		
MCH(fl):			MW	
Mean ± SD	27.53 ± 2.07	28.63 ± 11.85	5.25	**<0.001****
Range	22.5 – 32.4	17.5 – 75.1		
MCHC(gm/dl):			t	
Mean ± SD	34.01 ± 1.25	32.81 ± 1.41	10.06	**<0.001****
Range	30.3 – 35.6	29.3 – 35.7		
Serum ferritin(ug/l):	(n=100)	(n=122)		
Mean ± SD	21.13 ± 12.41	12.86 ± 8.06	MW	**<0.001****
Range	3.57 – 56.9	3.57 – 37.3	6.11	

Table 8:- Pregnancy outcome among the studied sample (n=460).

Pregnancy outcome	Studied sample (n=460)	
	No.	%
GA at delivery:		
Preterm (<37 W)	80	17.39
Full term (≥ 37 W)	380	82.61
Mode of delivery:		
Cesarean section	182	39.56
Vaginal delivery	278	60.44
Maternal postpartum bleeding:		
Present	55	11.95
Absent	405	88.05
Birth weight:		
Low (<2500 gm)	112	24.34
Normal (≥2500 gm)	348	75.66
Apgar score:		
Abnormal	73	15.86
Normal	387	84.13
Admission to NICU:		
Yes	80	17.39
No	380	82.61

Table 9:- Comparison of pregnancy outcome in anemic and non-anemic women (n=460).

Variable	Non anemic (n=238)		Anemic (n=222)		χ^2	P
	No	%	No	%		
GA at delivery:						
Preterm (<37 W)	28	11.77	60	27.02	57.56	0.017*
Full term (≥ 37 W)	210	88.23	162	72.98		
Mode of delivery:						
Cesarean section	100	42.01	88	39.63	53.08	0.001*
Vaginal delivery	138	57.99	100	60.37		
Maternal postpartum bleeding:						
Present	25	10.5	35	15.76	8.04	0.217
Absent	213	89.5	187	84.24		
Birth weight:						
Low (<2500 gm)	52	21.84	60	27.02	42.2	0.002*
Normal (≥2500 gm)	76	78.16	162	72.98		
Apgar score:						
Abnormal	35	14.7	45	20.27	2.41	0.368
Normal	203	85.3	177	79.73		

Discussion:-

Anemia is one of the main nutritional deficiency disorders affecting a large proportion of the population, not only in developing but also in industrialized countries. The current observational cross-sectional study was conducted at Banha University Hospital during the period between April 2015 and December 2015 to investigate the prevalence of iron deficiency anaemia and study the outcomes. A total of 500 uncomplicated pregnant women with a singleton pregnancy and free of any associated medical disorder were included in this study. The demographic characteristics of pregnant women revealed that most of them were young with an average age of 27 years (range: 16–40 years),(mean ± SD:27.99 ± 6.3).The recruited women were in the first trimester 57 cases (11.4%), second trimester 63 cases (12.6%) and third trimester 380 cases (76%) of pregnancy. There is 416 cases (83.2%) multigravidae and 84 cases (16.8%) primigravidae of the studied subject. There is 392 cases (94.24%) multipara and 24 cases (5.76%)nullipara. In the current study, the estimated prevalence of iron deficiency anaemia was 46.4% with the mean haemoglobin concentration of anaemic cases (232) 10.8 ± 1.19 (range7.2-12.7gm/dl), the mean of serum ferritin16.59 ± 11.03(range 3.57-56.9). World Health Organization (WHO) data showed that iron deficiency anaemia in pregnancy is a significant problem throughout the world with a prevalence ranging from an average of 14% of pregnant women in industrialized countries to an average of 56% in developing countries**(4)**Globally, the World Health Organization estimated that anaemia among pregnant women is 41.8%.The high prevalence of iron deficiency anaemia in the developing world has an effect on health and economic concerns including poor pregnancy outcome, impaired school performance and decreased productivity**.(5)** In developing countries the prevalence of anaemia among pregnant women is estimated to vary between 53% and 90% while it is estimated to be 8.3% in the developed countries**.(6).Afaf et al (2015**) conducted a survey during year 2010 among four target population groups including women of reproductive age 20 – 49.9 yr. The target groups were obtained from 11governorates representing 6 geographic regions: Urban governorates, Costal governorates, Suez Canal governorates, Lower Egypt governorates, Upper Egypt governorates and Frontier governorates. The survey reported that the prevalence of anemia among mothers was the highest (47.2%). The prevalence of anaemia reported by **EDHS of 2005**, was 39.4% for ever-married women (age 15 to 49 yr**).(7)** There is a great variation in the prevalence of iron deficiency anaemia reported by different authors **Elzahrani, 2012** (22.6%), **Mahfouz et al, 1994** (31.9**%).(8)** These differences could be explained by the strong association between the epidemiological variables and iron deficiency anaemia. In comparison to another study carried out in south India**(9),** the prevalence of iron deficiency anaemia (Hb less than 11g/dl and serum ferritin less than 12 ug/l) was found to highest among pregnant women in the second trimester while in the current study reported the highest prevalence of iron deficiency anaemia in the third trimesters, the difference in the findings may be due to differences in age groups, parity, inter pregnancy spaces and nutritional status.

In a study conducted in Venzula, 2005 the high prevalence of deficiency in pregnant women was reported during the second and third trimesters of pregnancy due to a blood dilution effect. However, when data are analysed by trimester of pregnancy, it can be observed that during the first trimester there is a 44.79% deficiency, which is not explainable by a dilution effect, but also is too high to be only due to a nutritional deficiency **(10).** In another study, results were reported by Rashed and his colleague in Alkhobr province in Saudi Arabia **(11)**anemia among their studied sample was 39% In the current study,anaemic pregnant women were at higher risk of postpartum bleeding (11.95%), increased cesearian delivery (39.65%), preterm delivery(<37 weeks),low birth weight(24.34%) and high rate of abnormal Apgar score(15.86%). The increased incidence of LBW in the present study could be due to low nutritional status, low income, illiteracy and poor antenatal care. Extensive literature reviews presented strong evidence for an association between maternal haemoglobin and birth weight as well as between maternal haemoglobin and preterm delivery. **(12).K. M. Rasmussen,(2001)** reported thatiron supplementation had a protective effect on adverse pregnancy outcome. On the other hand, severe maternal anaemia, particularly in the first trimester, is associated with adverse outcomes, namely, preterm birth, low birth weight, intrauterine growth restriction, low Apgar score, and operative deliveries**.(3).**In a study performed in tertiary care hospital **(13)** in Pakistan ,prematurity was the leading cause of perinatal death, it was lower than the perinatal mortality in other hospitals of Pakistan probably due to the better resuscitation and neonatal care facilities in our hospital. Severe anaemia(< 8 g/dL) has been reported to be associated with birth weight values that are 200–400 g lower than in women with higher (> 10 g/dL) haemoglobin values, but in that study other factors that might also have contributed to both LBW and the severity of anaemia were not excluded **.(13).**Nutrition education components of the antenatal care and community health service should be intensified. Also, during the health education activities in the clinics, the importance of family planning, early bookings, improvement in nutritional status and micronutrient supplementation for antenatal care need to be stressed **(14)**

References:-

1. **WHO (2001):** Iron Deficiency Anemia Assessment, Prevention and Control. A guide for programme managers. Geneva: Switzerland: World Health Organization WHO/UNICEF/UNU. P. 114.
2. **(2)WHO/CDC(2007):** Assessing the iron status of populations, 2nd ed. Report of a joint World Health Organization/Centers for Disease Control and Prevention technical consultation on the assessment of iron status at the population level. Geneva: World Health Organization.
3. **K.M. Rasmussen (2001):** is there a causal relationship between iron deficiency or iron deficiency anaemia and weight at birth, length of gestation, and perinatal mortality?, J Nutr, 131, pp. 590 S–601 S.
4. **World Health Organization (1994).** Prevention and Management of Severe Anaemia in Pregnancy: report of a technical working group. Geneva: WHL/FHE/MSM/93.3.
5. **(5)Zimmermann, M. B. &Hurrell, R. F. (2007)**: Nutritional iron deficiency. Lancet, 370, 511–520.
6. **(6)DeBenoist, B., McLean, E., Egli, I., Cogswell, M. (Eds) (2008):** WHO Global Database on Anaemia. Worldwide prevalence of anaemia 1993-2005.World Health Organization, Geneva, Switzerland.Dept of Health. Better Blood Transfusion HSC /001.
7. **(7) EDHS. (2005):** Egypt Demographic and Health Survey. El-Zanaty, Fatmaand Ann Way. 2006. Cairo, Egypt: Ministry of Health and Population, National Population Council, El-Zanaty and Associates, and ORC Macro.
8. **(8)Elzahrani, S. S. (2012):** Prevalence of Iron Deficiency Anemia among Pregnant Women AttendingAntenatal Clinics at Al-Hada Hospital Canadian Journal of Medicine, 3(1), 10-14.
9. **(9) Mahfouz, A. A., El-Said, M. M., Alakija, W., Badawi, I. A. & Al-Erian R. A. (1994):** " Anemia Among Pregnant Women in the Asir Region, Saudia Arabia". Southeast Asian Journal of Tropical Medicine and Public Health, 25(1), 84-7.
10. **(10)García-Casal MN, Osorio C, Landaeta M, Leets I, et al. (2005):** High prevalence of folic acid and vitamin B12 deficiencies in infants, children, adolescents and pregnant women in Venezuela. European Journal of Clinical Nutrition. 59(9): 1064-1070.
11. **(11)Rashed, P., M.R. Koura, BK. Al-Dabal and SM. Makki,(2008**):.Anemia in pregnancy : a study among attendees of primary health care center. Ann. Saudi. Med., 28: 449-452.
12. **(12) O. I. Fareh, D. E. E. Rizk, L. Thomas, and B. Berg(2005):** "Obstetric impact of anaemia in pregnant women in United Arab Emirates," Journal of Obstetrics &Gynaecology, vol. 25, no. 5, pp. 440–444, 2005.
13. **(13)Gregory P, Taslim A.(2001):** Health status of the Pakistani population: a health profile and comparison with the United States. American journal of public health, 2001, 91:93–8.
14. **(14)Gadowsky SL, Gale K, Wolfe SA, Jory J, et al. (1995):** Biochemical folate, B12, and iron status of a group of pregnant adolescents accessed through the public health system in southern Ontario. J Adolesc Health. 16(6):465–74.