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Original Article

Perinatal Outcomes of Maternal Anemia in Alexandria, Egypt

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Abstract

Background & Objective(s): Anaemia is considered the most frequent complication related to pregnancy. It is also the most common preventable cause of fetal and maternal mortality and morbidity. Despite the routine use of iron and folate supplementation for prevention of anaemia in Egypt, the prevalence of anaemia is still high This study was conducted to estimate the occurrence of anaemia and investigate the relationship between maternal anaemia and perinatal outcomes at Karmouz Family Health Unit in Alexandria.

Methods: The study involved 206 pregnant women in third trimester. It was conducted on two phases: First, a cross sectional study using an interviewing questionnaire to collect data about sociodemographic profile and drug history. Laboratory data was collected from records to estimate the occurrence of anaemia. Then, a prospective cohort study was carried out using a follow up sheet to assess perinatal outcomes of maternal anaemia.

Results: The results of our study show that the occurrence of anaemia among studied pregnant women was high (73.8%). Most of the women who did not regularly receive iron supplementation were anaemic. Maternal anaemia was shown to be significantly associated with preterm labor, low birth weight, congenital anomalies, small head sized babies and neonatal intensive care admission. Moreover, hemorrhage and infection were significantly encountered maternal complications.

Conclusion: Irregular intake of iron supplementation during pregnancy was significantly associated with anaemia. Moreover, maternal anaemia was significantly related to maternal and neonatal complications.

Keywords: Maternal anaemia; occurrence; perinatal outcome

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INTRODUCTION

Anaemia is a global public health challenge affecting all age groups with a serious high predilection among pregnant women and preschool children, especially in developing countries. [(1)] It is defined as a lack of functioning red blood cells (RBCs) that leads to decrease oxygen-carrying capacity of the blood to meet the physiological need of the body and it is characterized by a reduction in the hemoglobin (Hb) concentration.[(2)]

Anaemia is considered the most frequent complication related to pregnancy. The World Health Organization (WHO) classified anaemia in pregnancy according to the Hb level into mild (Hb 10 to 10.9 g/dl), moderate (Hb 7 to 9.9 g/dl), severe (Hb less than 7 g/dl) and very severe anaemia (Hb less than 4 g/dl).[(3)] Anaemia is a widespread health problem affecting 40.1% of pregnant women worldwide in 2016, according to the World Bank statistics.[(4)] According to the WHO in 2008, anaemia affects approximately 1.5 billion people worldwide. On the other hand, it affects 41.8% of pregnant women. Furthermore, in developing countries, maternal anaemia varied from 53 to 90% while it is estimated to be 8.3% in developed ones.[(5)]

In Egypt, the prevalence of anaemia in pregnancy was about 28% according to WHO in 2008, but in 2016 it was reported that the prevalence of maternal anaemia had fallen to 22.6% according to the World Bank's development indicators.[(4)] Moreover, the Egypt Demographic and Health Survey (EDHS) 2014 estimated that about 25% of ever married women in the reproductive age suffered from anaemia.[(6)]

Anaemia in pregnancy is the most common preventable cause of fetal and maternal mortality and morbidity. It not only affects the health of the mother, but also extend to her fetus.[(7, 8)] Several reports indicate a direct relationship between anaemia during pregnancy and

prematurity and low birth weight.[9, 10] Most studies suggest that a fall in the maternal Hb below 8.0 g/d1 increases the perinatal mortality rate by two to three folds and by eight to ten folds increase when the Hb falls below 5.0g/dl.[11-13] Despite the routine prescription of iron and folate supplementation and anti-malarial prophylaxis for pregnant women in certain developing countries, the prevalence of anaemia is still high. This points to the presence of other likely underlying factors; namely poverty and low standards of living which are still major problems facing most developing countries.[14-16]

Therefore, this study was conducted to estimate occurrence of maternal anaemia and investigate its relationship with perinatal outcomes at Karmouz Family Health Unit in Alexandria, Egypt.

METHODS

Study design and setting: The study was conducted on two phases: First, a cross sectional study was conducted to estimate the occurrence and identify possible risk factors of maternal anaemia. Then, a prospective cohort study was carried out to assess perinatal outcomes of maternal anaemia. The study was conducted in Karmouz Family Health Unit, Alexandria Governorate, Egypt. The data collection was conducted over four months from the 1st of May till the 31st of August 2017.

Target population and sampling: Pregnant women ≥ 28th week of gestation attending Karmouz Family Health Unit were included in the study. Women having chronic diseases such as cardiac disease, hypertension and diabetes mellitus, as well as those who refused to participate in the study were excluded.

The calculated sample size, using EPI INFO 7 software, was 189 women and was based on an expected prevalence of anaemia in women of 23%[4], 95% confidence level and a confidence limit of 6%. It was increased by 15% (217 cases were approached) to make up for possible drop-out of cases. The actual drop-out rate was 5% where 206 women continued to the follow-up phase.

Data collection: An interviewing questionnaire was used to collect data about sociodemographic profile (age, duration of marriage, education, occupation, place of residence) and drug history of iron supplementation and other medications. Also, laboratory data was collected from records of pregnant women at the time of the initial interview. Accordingly, based on the WHO cut-off value for serum Hb (11 gm/dl), [3] women were divided into anaemic and non-anaemic groups that were then compared in the follow up phase. Subsequently, a follow up sheet was used to collect data for each woman concerning the perinatal outcomes among the studied women and their neonates. This sheet was delivered to the woman on the initial visit. She was asked to get the sheet filled by the attending physician at the time of delivery and then, sheets were re-collected at the time of zero dose vaccination of the newborn at the study setting. The follow up sheet included data about type of delivery, obstetric complications like hemorrhage, infection and cardiac decompensation, and data about the newborn including sex, birth weight, gestational age, neonatal intensive care unit (NICU) admission, congenital anomalies, etc..

Data analysis

Data were analysed using SPSS, version 20.(17) Data were presented as number and percentage for categorical variables and mean, median and standard deviation (SD) for continuous variables. For comparisons between anaemic and non-anaemic women, the student t-test was used for normally distributed quantitative variables and the Mann-Whitney test for non-normally distributed variables. For qualitative variables, the chi-squared, Fisher exact, and Monte Carlo tests were used .

All results were interpreted at the 5% level of significance .

Ethical considerations

The study was approved by the Ethics Committee of the Faculty of Medicine, Alexandria University, and the Alexandria Directorate of Health Affairs. The objectives of the study and type of information to be obtained were explained to the women and their informed consent was taken. Confidentiality of data was assured.

RESULTS

Of the 206 women attending the studied family health unit and included in the study, 152 were anaemic with an occurrence rate of 73.8%.

Table 1 portrays the sociodemographic characteristics of the pregnant women. The mean age of the anemic group was 27.74 ± 6.19 years while that for non-anemic group was 27.81 ± 5.01 years. The mean duration of marriage in the anemic and non-anemic groups was 4.82 ± 5.39 and 4.43 ± 4.02 years, respectively. The majority (80.6%) of illiterate women and 76.3% of those with basic education were anaemic. Three quarters of housewives and 70% of working women were anaemic. Similarly, a comparable percentage of pregnant women whose husbands were working or were not working had anemia (73.6% and 80% respectively). Manual work was the most encountered occupation among husbands of studied women (31.8%), and among them 79.7% were anaemic. Nevertheless, no significant differences were observed between anaemic and non-anaemic women as regards the studied sociodemographic characteristics.

Regarding the drug history of the studied women, table 2 shows that more than three quarters (77.8%) of women who took iron supplementation during the current pregnancy were anaemic. Occurrence of anaemia was significantly lower among women with regular intake of iron supplementation compared to others (74.3% compared to 90.2%, respectively, p= 0.03). Anaemia was less frequently found among women with earlier start of iron supplementation (77.2% among women who started iron supplementation by the 4th month of pregnancy compared to 100% among women who started by the 7th month) without a statistically significant difference.

Table (1): Comparison between anaemic and non-anaemic pregnant women according to their socio-demographic characteristics

Socio-demographic characteristics	Non-anaemic (n = 54)		Anaemic (n = 152)		Total (n = 206)	Test of Sig.	*p*
	No.	%	No.	%			
Age (years)							
Min. – Max.	18.0 – 39.0		15.0 – 47.0		15.0 – 47.0		
Mean ± SD.	27.81 ± 5.01		27.74 ± 6.19		27.76 ± 5.89	*t*=0.070	0.944
Median	27.25		27.0		27.0		
Duration of current marriage(years)							
Min. – Max.	0.58 – 16.0		0.58 – 27.0		0.58 – 27.0		
Mean ± SD.	4.43 ± 4.02		4.82 ± 5.39		4.72 ± 5.06	t=0.492	0.624
Median	3.0		3.0		3.0		
Level of education							
Illiterate / read and write	6	19.4	25	80.6	31		
Basic education	14	23.7	45	76.3	59	χ^2=	0.655
Secondary education	18	28.1	46	71.9	64	1.621	
University education or higher	16	30.8	36	69.2	52		
Work status of the studied women							
Housewife	39	25.0	117	75.0	156	χ^2=	0.484
Working	15	30.0	35	70.0	50	0.489	
Professional work	2	25.0	6	75.0	8		
Semi-professional work	10	33.3	20	66.7	30	χ^2=	^{MC}p=
Skilled work	0	0.0	3	100.0	3	2.258	0.733
Manual work	3	42.9	4	57.1	7		
Trade work	0	0.0	2	100.0	2		
Level of education for husband							
Illiterate / read and write	8	30.8	18	69.2	26		
Basic education	7	13.7	44	86.3	51	χ^2=	0.137
Secondary education	23	31.1	51	68.9	74	5.533	
University education or higher	16	29.1	39	70.9	55		
Work status for husband							
Not working	1	20.0	4	80.0	5	χ^2=	^{FE}p=1.000
Working	53	26.4	148	73.6	201	0.102	
Professional work	5	33.3	10	66.7	15		
Semi-professional work	12	25.0	36	75.0	48	χ^2=	^{MC}p=
Skilled work	9	25.0	27	75.0	36	4.151	0.544
Manual work	13	20.3	51	79.7	64		
Trade work	14	36.8	24	63.2	38		
Place of residence							
Alexandria	50	25.6	145	74.4	195	χ^2=	^{FE}p=
Outside Alexandria	4	36.4	7	63.6	11	0.619	0.484

t: Calculated value of Student t test
χ^2, *p*: χ^2 and p values for Chi square test
^{MC}p: *p* value for Monte Carlo test
^{FE}p: *p* value for Fisher Exact test

Table 3 compares the anaemic and non-anaemic groups according to the pregnancy outcome. The incidence of still birth was higher among the anaemic women compared to the non-anaemic ones (4.5% compared to 1.8%, respectively). However, the difference was statistically insignificant (p= 0.684). The mean gestational age among the anaemic women was significantly lower than that of the non-anaemic ones (37.03 ± 2.57 weeks compared to 38.77±1.75 weeks, respectively, p< 0.001). Low birth weight (LBW) was significantly higher (p< 0.001) among new-borns of the anaemic women compared to those of non-anaemic (54.2% versus 10.7%, respectively). Also, the mean head circumference among babies of anaemic women was significantly smaller than that of the non-anaemic ones (31.12 ± 3.29 cm compared to 33.85 ± 2.23 cm, respectively, p= 0.001). Furthermore, congenital anomalies were only encountered among babies of the anaemic women (7.7%) with a statistically significant difference (p= 0.039). In addition, the incidence for NICU admission was significantly higher among babies of the anaemic women compared to those of the non-anaemic ones (38.1% compared to 7.1%, respectively, p< 0.01)

The perinatal outcomes on the mother are outlined in table 4. Regarding the type of delivery, caesarean section was more encountered among the non-anaemic women compared to the anaemic ones (53.7% compared to 48.7%, respectively) but the difference was statistically insignificant (p= 0.791). The incidence of haemorrhage was significantly higher among the anaemic women compared to the non-anaemic ones (24.3% compared to 3.7%, respectively, p< 0.001). Moreover, the mean amount of bleeding, reflected by the number of used pads per hour, was significantly higher among the anaemic women compared to the non-anaemic ones (3.73 ± 0.80 pad/hour

compared to 3.0 ± 0.0 pad/hour, respectively $p< 0.001$). Also, the incidence of infection was significantly higher among the anaemic women compared to the non-anaemic ones (27.0% compared to 7.4%, respectively, $p= 0.003$). On the other hand, cardiac decompensation was insignificantly more presented among the anaemic women compared to the non-anaemic ones (9.9% compared to 3.7%, respectively, $p= 0.249$).

Table (2): Comparison between anaemic and non-anaemic pregnant women according to drug history during current pregnancy

Drug history	Non-anaemic (n = 54)		Anaemic (n = 152)		Total (n = 206)	χ^2	*p*
	No.	%	No.	%			
Regular intake of medications							
No	7	87.5	1	12.5	8	18.863	$^{FE}p< 0.001^*$
Yes	47	23.7	151	76.3	198		
Type of medications**							
Iron supplementation	42	22.2	147	77.8	189	18.863	$< 0.001^*$
Others***	9	21.4	33	78.6	42	0.020	0.888
Timing of iron intake	(n = 42)		(n = 147)		(n=189)		
4th month	39	22.8	132	77.2	171		
5th month	2	20.0	8	80.0	10	0.526	^{MC}p=1.000
6th month	1	20.0	4	80.0	5		
7th month	0	0.0	3	100.0	3		
Regular intake of iron therapy	(n = 42)		(n = 147)		(n=189)		
No	4	9.8	37	90.2	41	4.708	0.03^*
Yes	38	25.7	110	74.3	148		

χ^2, *p*: χ^2 and p values for Chi square test
^{FE}p: *p* value for Fisher Exact test
^{MC}p: *p* value for Monte Carlo test
*Statistically significant at $p< 0.05$
**some women took more than one medication
***Other medications: calcium supplementation, omega 3 capsule, aspirin or multivitamin

Table (3): Comparison between the non-anaemic and anaemic pregnant women according to pregnancy outcome

Pregnancy outcome**	Non-anaemic (n = 56)		Anaemic (n = 155)		Total (n = 211)		Test of Sig.	*p*
	No.	%	No.	%	No.	%		
Livelihood								
Live birth	55	98.2	148	95.5	203	96.2	χ^2=	^{FE}p=
Still birth	1	1.8	7	4.5	8	3.8	0.841	0.684
Gestational age								
Full term (>37 weeks)	49	87.5	87	56.1	136	64.5	χ^2= 17.671	$<0.001^*$
Pre term (<37weeks)	7	12.5	68	43.9	75	35.5		
Min. – Max.	32.0 – 43.0		30.0 – 41.0		30.0 – 43.0			
Mean ± SD.	38.77 ± 1.75		37.03 ± 2.57		37.49 ± 2.50		*t*= 5.487	$<0.001^*$
Median	39.0		38.0		38.0			
Gender								
Male	34	60.7	83	53.5	117	55.5	χ^2=	0.355
Female	22	39.3	72	46.5	94	44.5	0.855	
Birth weight (gram)								
LBW (<2500 g)	6	10.7	84	54.2	90	42.7	χ^2= 31.794	$<0.001^*$
Normal (≥2500 g)	50	89.3	71	45.8	121	57.3		
Min. – Max.	2100 – 4250		800 – 4800		800 – 4800			
Mean ± SD.	3225.6± 526		2517 ± 786		2703.4±790		Z=7.377	$<0.001^*$
Median	3275.0		2400.0		2750.0			
Head circumference								
Min. – Max.	27.0 – 37.0		23.0 – 37.0		23.0 – 37.0			
Mean ± SD.	33.85 ± 2.23		31.12 ± 3.29		31.83 ± 3.27		*t*= 6.768	$<0.001^*$
Median	34.50		31.0		32.0			
Congenital anomalies								
Yes	0	0.0	12	7.7	12	5.7	χ^2=	^{FE}p=
No	56	100.0	143	92.3	199	94.3	4.597	0.039^*
NICU admission								
Yes	4	7.1	59	38.1	63	29.9	χ^2=	$<0.001^*$
No	52	92.9	96	61.9	148	70.1	18.781	

**: Some women gave birth to twins
t: Calculated value of Student t test
Z: Z value of Mann Whitney U test
χ^2, *p*: χ^2 and p values for Chi square test
^{FE}p: *p* value for Fisher Exact test
*: Statistically significant at $p< 0.05$

Table (4): Comparison between the non-anaemic and anaemic pregnant women according to perinatal impacts on the mother

Perinatal impacts	Non-anaemic (n = 54)		Anaemic (n = 152)		Total (n = 206)		Test of Sig.	*p*
	No.	%	No.	%	No.	%		
Type of delivery								
Vaginal	22	40.7	67	44.1	89	43.2	χ^2= 0.469	0.791
Cesarean section	29	53.7	74	48.7	103	50.0		
Assisted (Forceps)	3	5.6	11	7.2	14	6.8		
Hemorrhage								
Yes	2	3.7	37	24.3	39	18.9	χ^2= 11.058	<0.001*
No	52	96.3	115	75.7	167	81.1		
Amount of hemorrhage (number of pads/hour)								
Min. – Max.	3.0 – 3.0		3.0 – 6.0		3.0 – 6.0		*t*=5.518	<0.001*
Mean ± SD.	3.0 ± 0.0		3.73 ± 0.80		3.69 ± 0.80			
Median	3.0		4.0		4.0			
Infection								
Yes	4	7.4	41	27.0	45	21.8	χ^2=8.935	0.003*
No	50	92.6	111	73.0	161	78.2		
Cardiac decompensation								
Yes	2	3.7	15	9.9	17	8.3	χ^2= 2.000	^{FE}p= 0.249
No	52	96.3	137	90.1	189	91.7		

χ^2, *p*: χ^2 and p values for Chi square test
^{FE}p: *p* value for Fisher Exact test
*: Statistically significant at $p < 0.0$

DISCUSSION

Maternal anaemia not only impairs maternal health and well-being, but also causes adverse outcomes for the mother as it increases the risk of postpartum hemorrhage, infection and cardiac failure which in turn increases the prevalence of maternal mortality. Moreover, maternal anaemia is associated with preterm birth and low birth weight and increases the risk of perinatal mortality. [7, 18]

The present study assessed the occurrence of maternal anaemia, its determinants and its perinatal outcomes among pregnant women attending Karmouz Family Health Unit, which serves a low socioeconomic area, with a low level of education among most of its population.

The occurrence rate of anaemia among pregnant women attending the unit was 73.8%. This figure was higher than the national prevalence of maternal anaemia in Egypt in 2016 (23%).[4] This might be because all women in the current study were at the third trimester of their pregnancy when anaemia is more manifested. Nevertheless, the high occurrence rate observed in the present study was surprising considering the routine practice at the unit to provide pregnant women with prophylactic elemental iron of 60 mg/day and higher doses in cases of anaemia. Accordingly, it might be attributed to the low compliance with iron supplementation which could be related to low socioeconomic standard in this area and lack of health awareness.

This rate was also higher than that reported in a study by Fahmy et al in Menofyia University, Egypt, who found that the prevalence of maternal anaemia was 66% [19] and studies conducted in Ethiopia; Boditi (61.6%), and Gondar (56.8%).[20,21] Low socioeconomic status affects healthcare seeking behavior and nutrition as well as infestations and infections that may lead to anaemia.[22]However, in this study, socio-demographic characteristics (women's age, level of education, working status, the husband's education and working status) did not show any significant association with anaemia. The possible explanation for this finding might be the homogeneity of the studied women as most of them were residents of the same area (Karmouz), having similar low socioeconomic level and having the same beliefs rendering them collectively at higher risk of anaemia.

Unexpectedly, more than three quarters (77.8%) of women who took iron supplementation during current pregnancy were anaemic. This raises questions regarding the prescription guidelines followed. Another factor could be the women's compliance and whether they took the iron supplementations irregularly, in inadequate doses or did not take it at all. Major barriers to consuming medication were forgetfulness followed by cost and adverse effects. Perhaps this was a result of inadequate counseling by health care providers, or due to a wrong popular belief that the intake of any medication during pregnancy will harm the fetus. Many studies have also reported an increased risk of anaemia in mothers who were irregular takers of iron pills.[23,24] More studies are needed to evaluate the effectiveness of the current WHO nutritional supplementation recommendation program in the prevention and control of anaemia in pregnant women.[25]

Irregular intake of iron was significantly associated with anaemia in the present study where occurrence of anaemia was significantly lower among women with regular intake of iron supplementation compared to others (74.3% compared to 90.2%, respectively). Gautam et al., in their study on compliance with iron and folic acid

supplementations, found that there was an association between regular intake and Hb levels. They observed that a significant fall in Hb level occurred when less than 50 tablets were consumed as compared to a maximum rise when more than 125 tablets were consumed by pregnant women.[26] A study from rural Bihar in India also reported that 24% of pregnant women consumed iron and folic acid for 90 days. The authors concluded that women were likely to take iron and folic acid regularly if they received good nutritional counseling during their antenatal visits.[27]
It should be noted, however, that most of the currently studied women took iron supplementation. This could be explained by the routine prescription of iron supplementation by the unit physicians to each pregnant woman at her 4th month of pregnancy that continues until delivery, which is in accordance with the WHO program on the prevention and control of anaemia in pregnancy.[28]
The current study evaluated the adverse neonatal outcomes among anaemic and non-anaemic pregnant women. As revealed by the results, maternal anaemia was a significant risk factor for neonatal low birth weight, small head circumference, congenital anomalies and preterm birth. Preterm birth occurred in 43.9% among anaemic women compared to only 12.5% of non-anaemic ones, while low birth weight was significantly higher among newborns of the anaemic women (54.2%) compared to newborns of non-anaemic women (10.7%). This was in accordance with the study done by Gupta et al., who noted that preterm birth and low birth weight were found in 42% and 43% of infants of anaemic women respectively [37] and by Tyagi et al., who found that both preterm birth and low birth weight were found in 48.4% of infants of anaemic women.[38]
Other studies also suggested that anaemia in pregnancy is highly associated with an increased risk of adverse pregnancy outcomes.[18, 39] The effect of anaemia on birth weight may be dependent on maternal Hb concentration, since it is required for oxygen transport across the placenta and the oxygen supply may have a direct bearing on the development of intrauterine growth retardation (IUGR).[40]
In the current study, there was a significant increased risk of NICU admission among the infants of anaemic women (38.1%) compared to non- anaemic ones (7.1%). This may be due to the higher incidence of preterm birth and low birth weight among the anaemic women than the non-anaemic ones. This result was in accordance with the study by Drukker et al., which evaluated the effects of anaemia on adverse neonatal outcomes and revealed higher NICU admission for infants of anaemic mothers. They concluded that correction of maternal anaemia even in late pregnancy is very important in preventing these adverse outcomes.[41]
Similarly, Raisanen et al., found a significant association between maternal anaemia and increased admission to NICU and underscored that maternal anaemia was associated with several adverse perinatal outcomes.[42]
Regarding perinatal outcomes of anaemia on the mother, the current study revealed that maternal anaemia was significantly associated with increased risk of maternal infection were 27% of anaemic women got infection compared to 7.4% of non-anaemic ones. It may be due to the adverse effect of anaemia on the immune function, by altering the proliferation of T and B lymphocytes and by reducing the bactericidal activity of phagocytes and neutrophils.[7,43] Moreover, anaemia significantly increased the risk of perinatal vaginal bleeding. These findings were consistent with the literature in terms of postpartum maternal results. Frass in her study reported that postpartum hemorrhage was related to Hb levels at labor and the severity of anaemia was an important factor that causes greater blood loss and adverse maternal outcomes.[44] Similarly, studies done by Kavle et al.,[45] and Yılmaz et al.,[46] found that anaemia increased the incidence of hemorrhage during pregnancy. A possible explanation for this finding is that women with anaemia are more likely to have uterine atony due to impaired transport of oxygen and Hb to the uterus.

In spite of the great effort done by the government to prevent anaemia in pregnant women through iron supplementation, dietary counseling, periodic screening during antenatal checkups, treatment of chronic illnesses and worm infestations, family planning and community surveillance, Egypt still faces a big hurdle in effective management of this problem and in reducing the incidence and prevalence of anaemia in pregnancy. The reasons for that are at various levels, starting with planning, lack of resources, poor utilization of services and ineffective implementation of the plan. Along with this, illiteracy, poverty, unemployment, ignorance, malnutrition, remote health care service places, underutilization of medical services and population explosion makes this problem more difficult to be managed.
This study was conducted at a low social economic area, the majority of the pregnant women were anemic and so the prevalence of anemia was higher than expected. Also, this masked the effect of socio-demographic factors on occurrence of anemia. Moreover, some cases were lost during follow up.

CONCLUSION & RECOMMENDATIONS

The results of our study show that the occurrence of anaemia among studied pregnant women was high (73.8%). Irregular intake of iron supplementation was significantly associated with anaemia. Maternal anaemia was shown to be significantly associated with preterm birth, low birth weight, congenital anomalies, small head size and NICU admission. Moreover, haemorrhage and infection were significantly encountered maternal complications.

It is recommended to enforce proper prenatal care and education from medical professionals to improve the health of the mother and the developing fetus during pregnancy. The use of health educational aids (posters or photos) during antenatal visits would raise women's awareness about the complications of maternal anaemia

and the importance of compliance with iron supplementation during pregnancy.

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