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Prevalence of anemia in pregnant women attending AL-Taakhi PHCC in Kikuk city, Iraq

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Abstract

Background: Pregnancy-related anemia is a major public health issue that poses a serious risk to the health of both the mother and the child. The World Health Organization (WHO) states that anemia with a rate of $\geq 40\%$ has serious public health implications. Our study objectives the estimated rate of anemia in pregnant women attending AL-Taakhi PHCC in Kirkuk governorate.

Material and Methods: A cross-sectional study was conducted at AL-Taakhi PHCC, Kirkuk, Iraq, from May 1st to August 1st, 2025. Pregnant women who have had Antenatal care (ANC), were directly interviewed using a structured questionnaire. Anemia was defined by Hemoglobin (Hb) concentration less than 11.0 g/dL and classified as mild (10.0-10.9 g/dL), moderate (7.0-9.9 g/dL), and severe (<7.0 g/dL). Official approval was obtained. Categorical data was analyzed using Fisher-Exact tests. P-value <0.05 was considered statistically significant.

Results: A total of 200 pregnant women who have had Antenatal care, 108 (54.0%) of them had mild to moderate anemia, while 10 (5.0%) of them had severe anemia. 137 (68.5%) women were within 20-29 years of age. Anemia causes included primiparous status 38 (19.0%), Lower educational attainment 50 (25.0%) and previous history of anemia 109 (54.5%). Anemia in pregnancy were significantly higher in young maternal age (less than 20 years), with short interpregnancy interval (less than 12 months) and those who rare/never consumed iron-rich food or irregularly taking supplements ($P=0.0001$, $P=0.0002$) respectively.

Conclusions: The high prevalence of 59.0% confirms that maternal anemia is a severe public health problem in Kirkuk. The most significant and controllable determinants were previous history of anemia, young maternal age, and short interpregnancy interval.

Keywords: Anemia in pregnancy

Introduction

Pregnancy-related anemia is a major public health issue that poses a serious risk to the health of both the mother and the child. The risk factors linked to its occurrence are controversial and uncertain, nevertheless it increase the risk of maternal and perinatal mortality ^[1].

The WHO states that anemia with a rate of $\geq 40\%$ has serious public health implications. Pregnancy-related anemia is a major global public health issue, especially in developing nations where prenatal nutrition is inadequate and prenatal vitamin, iron, and folic acid intake is low. It impacts an individual's physical and mental development, leading to low productivity and a nation's economic development, whoever the need to improve maternal health surveillance overall is well recognized and a current national priority ^[2]. Healthy infant development during pregnancy requires enough consumption of macronutrients and micronutrients ^[3].

Iron deficiency is one of the most prevalent causes of anemia in low- and middle-income nations. However, anemia can also be caused by genetic problems, viral infections, and other micronutrient deficiencies, including folic acid, vitamin B12, and vitamin A ^[4, 5].

The most common cause of anemia in pregnancy in Iraq is iron deficiency anemia, the majority of a child's iron needs during the first year of life are satisfied by the iron they are born with, either in the form of hemoglobin or iron reserves (ferritin). The iron transfer from mother to child in utero, which takes place throughout the second and third trimesters of pregnancy, has a significant impact on the amount of ferritin and hemoglobin at birth. Research has indicated that low cord hemoglobin levels and anemia in infancy are correlated with anemia during pregnancy ^[6, 7, 8].

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In the developing country like Egypt a study conducted in 2024 revealed that the percentage of anemia in pregnant Egyptian women was 49% [9].

Another cross sectional study conducted in southern Jordan in 2024 showed that 36.8% had anemia [10]. While in Turkey the percentage was lower than both Egypt and Jordan; Anemia prevalence was 27.1% in 2010 [11].

The WHO estimates the prevalence of anemia in pregnant women (aged 15-49) in Iraq to be 35.2% for the year 2023. while the rate in 2019 was 34.3%, this increase can be explained by : dietary iron deficiency, parasitic infections, limited healthcare access, and high fertility rates [12].

This study aims to estimate the rate of anemia in pregnancy in AL-Taakhi PHCC in Kirkuk governorate and its determinants.

Materials and Methods

Setting and study design

A cross-sectional study carried out in Altaakhi PHC in Kirkuk governorate, Iraq, over the period from May 1st to Aug 1st, 2025.

Study subjects

All pregnant women who attended ANC in Altaakhi PHC were eligible for participation in this study regardless of their age. Exclusion criteria included those who refused to voluntarily participate.

Sampling method

Convenience sampling was used in this study.

Data collection procedure

A structured questionnaire was used to obtain information through direct interviews which lasted for 10- 15 min with every women. The questionnaire was divided into 5 sections included different variables that cover the demographical characteristics of the mother (age, education, and occupation), parity, history of present pregnancy, dietary and supplementation practices and anemia diagnosis by Hb level.

Statistical analysis

Microsoft Excel 2010 and IBM SPSS version 26 were used for data entry, management, and analysis. Descriptive data will be presented as tables and figures. Categorical data will be tested using the Fisher Exact tests. Quantitative data will be analyzed using a t-test or Z-test. P-value <0.05 will be considered statistically significant.

Ethical considerations

The study protocol was approved by the Center of Training and Human Resources Development. Official approval was obtained from the PHCC management.

Verbal consent was obtained from all women. Data used for this research and all personal information will be confidential.

Results

This study included 200 pregnant women; 71 (35.5%) of them were within the age group 20-24 years, 66 (33.0%) of them were within the age group 25-29 years, 45 (22.5%) of them aged 30 years and more, and 18 (9.0%) of them aged less than 20 years. Forty-three (21.5%) of women were

employed. Women's education were primary school among 58 (29.0%). as shown in Table 1

There were 112 (56.0%) multiparous mothers (2-4 children), regarding gestational age; the majority of participant were in 2nd trimester 101 (50.5%) and 3rd trimester 83 (41.5%). half of the participants were have less than 12 month interpregnancy interval 99 (49.5%) followed by 12-24 month interval was 73 (36.5%), and 109 (54.5%) women have a previous history of anemia. as shown in Table 2.

Out of the total participants; 82 (41.0%) pregnant lady have normal hemoglobin level, 108 (54.0%) of them have mild to moderate anemia, while 10 (5.0%) of them had severe anemia. (Figure 1).

Out of the total participants; 47 (23.5%) consuming iron rich- food daily while 41(20.5%) rarely eating iron rich food. 75 (37.5%) of them taking tonics (supplement) but in irregular manner and 54 (27.0%) of them not taking supplements at all. as shown in Table 3.

Table 4 shows the distribution of sociodemographic features of participants according to the severity of anemia. Mild to moderate anemia was significantly higher among pregnant lady younger than 20 years and those with secondary school education (P=0.0001 and P<0.0049) respectively.

Table 5 shows the distribution of obstetrical and medical history of participants according to category of anemia. Mild to moderate anemia was significantly higher among primiparous lady, inter pregnancy interval less than 12 month and mothers with previous history of anemia (P=0.0026, P=0.0001, and P=0.0002) respectively.

Mild to moderate anemia was significantly higher among those who never or rarely consume iron rich food (P= 0.0001), while those who take supplement daily have no anemia (P= 0.0001). as shown in table 6.

Discussion

This cross-sectional study of anemia in pregnancy in Al-Taakhi PHCC in Kirkuk was undertaken to evaluate the prevalence and severity of anemia, its associated demographic, obstetric and nutritional determinants among pregnant women attended antenatal care. The results support that anemia remains a serious public health problem in the region, as some risk factors need to be further targeted.

In the current study, the overall prevalence of anemia (mild, moderate, and severe) was 59.0%, with severe anemia found in 5.0% of the population.

This high prevalence was consistent with rates reported in regional studies for example, a study in Kirkuk [13] and Baghdad [14], found a similar high prevalence, often exceeding 50% [15] both of which showed high endemic rates. This showed that shared socioeconomic variables, dietary habit, and healthcare access concerns were consistently associated with high anemia rates across the country's major urban centers.

But this result contradicts the World Health Organization's (WHO) commonly quoted 20-40% rates for nations with low-to-moderate endemicity [4]. Our findings indicated that anemia remains a serious public health issue (prevalence > 40%) in the research area, putting it at a higher risk than many industrialized nations.

Regarding maternal age, the youngest age group (less than 20 years) had the largest burden of anemia (33.3% of severe anemia), which was consistent with studies conducted in both Iraqi and international contexts [15, 13]. This was explained by the biological conflict for nutrients between

the developing fetus and the still-growing adolescent mother, which causes a rapid depletion of nutritional stores. While a history of anemia revealed to be the most important clinical predictor, accounting for 60% of all Severe Anemia cases. This was fully consistent with the literature, which emphasized that anemia was frequently recurring ⁽¹⁶⁾. The findings revealed a defect in the healthcare system's ability to provide adequate, continuous iron replacement during the postpartum period, causing mothers to start subsequent pregnancies already deficient.

The highly significant association ($P < 0.0001$) between the short Inter pregnancy interval (less than 12 month) and high anemia rate was consistent with global study in Nigeria and local study in Diyala ^[17, 18]. This physiological concept stated that fewer than 18-24 months between deliveries is inadequate time to properly rebuild iron and folate levels that were reduced during the prior pregnancy and lactation. The significant associations found for Education ($P = 0.0049$) and Parity ($P = 0.0026$) were consistent with the documented socioeconomic factors of anemia ^(19, 20). Lower education was frequently associated with poor health literacy, poor compliance with iron supplementation, and decreased access to appropriate antenatal care.

The observed study revealed that there was no significant association between gestational age and anemia, the observation disagreed with the physiological hypothesis that iron requirement increases in the second and third trimesters, frequently leading to higher anemia prevalence

later in pregnancy ^[21]. This unexpected result could be attributed to the study's categorization, or it might suggest that anemia developed early in this study as a result of pre-existing impairments, rather than being driven solely by subsequent physiological demands.

Regarding occupation no significant association was found ($P = 0.4170$). This finding disagreed with certain international research that linked specific occupations (e.g., heavy manual labor or a lack of workplace perks) to poor maternal health ^[22]. In the Iraqi context, this lack of correlation could be attributed to the consistency of lifestyle or healthcare availability across different occupational groups within the study population.

The most significant and challenging findings included women who consumed supplement and iron-rich diet intake. Mothers with the high consumption levels for both variables had the highest risks of anemia, this was inconsistent with a study conducted in Ghana ^[23]. This finding might suggest that women initiated or considerably increased their iron supplementation and consumption of iron-rich foods after being diagnosed with anemia or receiving medical guidance.

Limitations of the study

The sampling method used was Consecutive convenient sampling not randomized this can cause an inability to generalize the result and the study design was Cross-sectional and can't therefore address the changes in the rates of anemia in pregnancy over time.

Table 1: Sociodemographic characteristic of participants

Sociodemographic characteristic		No.	%
Maternal age	<20	18	9.0
	20-24	71	35.5
	25-29	66	33.0
	≥30	45	22.5
Mothers' occupation	Employed	43	21.5
	Not employed	157	78.5
Mother's education	Primary school	58	29.0
	Secondary school	50	25.0
	College	53	26.5
	None	39	19.5
Total		200	100.0

Table 2: Obstetrical and Medical history of participants

Variables		No.	%
Obstetrical history			
Parity	Primiparous	38	19.0
	1-4	112	56.0
	≥5	50	25.0
Gestational age	1 st trimester	16	8.0
	2 nd trimester	101	50.5
	3 rd trimester	83	41.5
Interpregnancy interval	<12 months	99	49.5
	12-24 months	73	36.5
	>24 months	28	14.0
Past Medical history			
Previous History of Anemia	Yes	109	54.5
	No	91	45.5
Total		200	100.0

Table 3: Characteristic of Iron-Rich Food Consumption and Supplement intake

Variables		No.	%
Iron-Rich Food Consumption	Daily	47	23.5
	3-4 times/week	112	56.0
	Rarely/Never	41	20.5
Supplement intake	Daily	71	35.5
	Irregularly	75	37.5
	Never	54	27.0
Total		200	100.0

Table 4: Distribution of sociodemographic characteristic of patients and anemia severity.

Variables		Severity of anemia						P* value
		Not anemic		Mild to mod. anemia		Severe anemia		
		No.	%	No.	%	No.	%	
Maternal age	<20	0	0.0	12	66.7	6	33.3	0.0001
	20-24	28	39.4	41	57.7	2	2.8	
	25-29	30	45.5	34	51.5	2	3.0	
	≥30	24	53.3	21	46.7	0	0.0	
Mothers' occupation	Employed	14	32.6	27	62.8	2	4.7	0.417
	Not employed	68	43.3	81	51.6	8	5.1	
Mother's education	Primary school	21	36.2	31	53.4	6	10.3	0.0049
	Secondary school	15	30.0	33	66.0	2	4.0	
	College	33	62.3	20	37.7	0	0.0	
	None	13	33.3	24	61.5	2	5.1	

* (Fisher's Exact Test. Statistically significant association $P < 0.05$)**Table 5:** Distribution of obstetrical and medical history of participants and anemia severity.

Variables		Severity of anemia						P* value
		Not anemic		Mild to mod. anemia		Severe anemia		
		No.	%	No.	%	No.	%	
Parity	Primiparous	9	23.7	29	76.3	0	0.0	0.0026
	1-4	51	45.5	51	45.5	10	8.9	
	≥5	22	44.0	28	56.0	0	0.0	
Gestational age	1 st trimester	6	37.5	8	50.0	2	12.5	0.55
	2 nd trimester	45	44.6	52	51.5	4	4.0	
	3 rd trimester	31	37.3	48	57.8	4	4.8	
Inter pregnancy interval	<12 months	21	21.2	70	70.7	8	8.1	0.0001
	12-24 months	41	56.2	30	41.1	2	2.7	
	>24 months	20	71.4	8	28.6	0	0.0	
Previous Hx of anemia	Yes	33	30.3	66	60.6	10	9.2	0.0002
	No	49	53.8	42	46.2	0	0.0	

* (Fisher's Exact Test)

Table 6: Distribution of Iron-Rich Food consumption and supplement intake characteristic among participants and anemia severity.

Variables		Severity of anemia						P* value
		Not anemic		Mild to mod. anemia		Severe anemia		
		No.	%	No.	%	No.	%	
Iron-Rich Food consumption	Daily	28	59.6	17	36.2	2	4.3	0.0001
	3-4 times/week	51	45.5	59	52.7	2	1.8	
	Rarely/Never	3	7.3	32	78.0	6	14.6	
Supplement intake	Daily	53	74.6	18	25.4	0	0.0	0.0001
	Irregularly	27	36.0	44	58.7	4	5.3	
	Never	2	3.7	46	85.2	6	11.1	

* (Fisher's Exact Test)

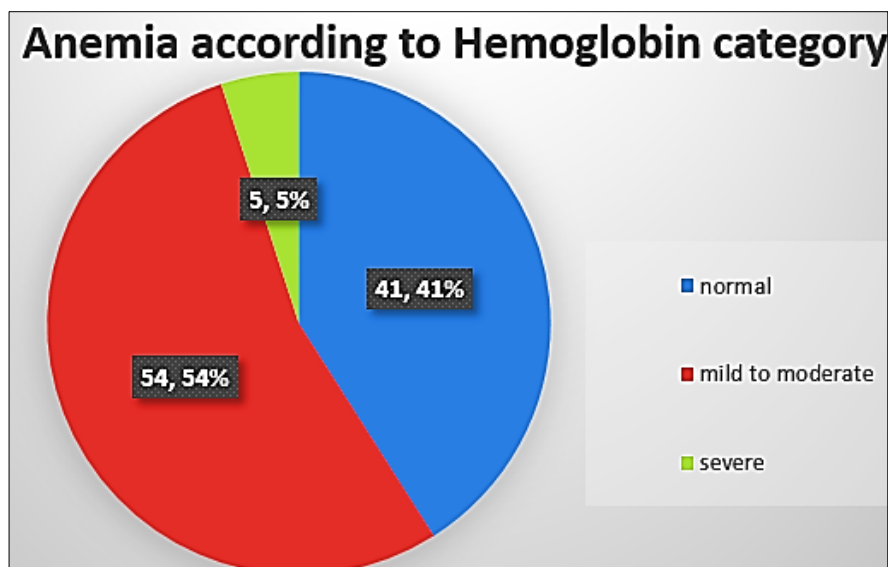


Fig 1: Distribution of 200 women according to severity of anemia

Conclusion and recommendations

The high prevalence of 59.0% confirms that maternal anemia is a severe public health problem in Kirkuk. The most significant and controllable determinants were previous history of anemia, young maternal age, and short interpregnancy interval. We would therefore recommend screening and education should specifically target adolescent mothers and women with low educational attainment to emphasize the importance of spacing pregnancies and adhering to supplementation.

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