Maternal Iron Deficiency Anemia as A risk Factor for Preterm Labor in Salaheddin Governorate, Iraq, 2022

Dr.Kawthar J. Mohamed[(1)], Prof. Dr. Nabila K. Yaqoub[(2)]

[(1)(2)]Department of Obstetrics and Gynecology, Tikrit University, Salaheddin, Iraq

Corresponding Author:

Dr.KawtharJabar Mohamed,Department of Obstetrics and Gynecology, Tikrit University, Salaheddin, Iraq

Abstract

Background: Globally, approximately 11.1% of live births are preterm deliveries, and preterm labour accounts for as much as 75-80% of neonatal morbidity and mortality which imposes physical, psychological, and economic burdens on babies, mothers, and families. Iron deficiency, iron-deficiency anemia, and inflammatory processes either related to infection or sterile inflammatory response represent risk factors for preterm labour

Aim: Decrease the prevalence of preterm labour and its complication.Assess the impact of iron deficiency anemia on the pregnancy as a cause of preterm labour. Find out the main factorsthat might be associated with increased risk of anemia in pregnancy.

Method:A case-control study was conducted in Salaheddin General Hospital /Gynecology and Obstetrics department during the period from 1st of January to 30th of June 2022.A convenient sample of 100 pregnant women was included in the current study and consisted of two groups: The case group (included 50 pregnant women who had preterm labour and the control group (included 50 pregnant women who presented at term labour and matched with the case group regarding the age, body mass index, parity, and abortion.

Results: There was a significant association between anemia and preterm labour as 52% of the participants in the case group had anemia. The means of haemoglobin, total iron binding capacity, and transferrin saturation were significantly higher in the control group compared to the case group. In contrast, serum ferritin was significantly higher in the case group compared to the control group.

Conclusion: Anemia was considered a significant risk factor for preterm labour.The age of the pregnant women, educational level, and the frequency of antenatal visits were significantly impacted the incidence of anemia during pregnancy.

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Introduction

Iron is an essential micronutrient for humans, as it is required in several vital biological processes(1).

Iron deficiency can exist without anemia when iron stores are absent but the ongoing iron deficit is not sufficiently severe to produce a decreased haemoglobin concentration. This state is much more common in healthy women than in healthy men. Iron deficiency was found in 9.5% of healthy adult female volunteers (premenopausal and postmenopausal), but only 1.5% of men(2).

A recent analysis estimated that roughly one-third (i.e., >2.5 billion people) of the world's population is anaemic. Anaemia and iron deficiency are global health issues. Iron deficiency is one of the most common nutritional deficiencies in the world because it is thought to be the root cause of more than half of the cases of anaemia(3). It

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affects all age groups starting from puberty and adolescence to perimenopausal age.

During pregnancy, iron necessities increase thus aggravating the prevalence of anaemia, also there is an unequal increase in the volume of plasma more than red cell mass leading to a physiological decrease in haemoglobin level in the mid-trimester(4).

The overall iron necessity during pregnancy is much greater than in the non-pregnant state, despite the temporary iron losses incurred during menstruation. Iron needs rise exponentially during pregnancy to encounter the elevated demands of the fetoplacental unit, expand maternal erythrocyte mass, and compensate for the iron loss at delivery(2).

Over 50% of women in developing countires experience iron deficiency and iron deficiency anaemia (IDA) during pregnancy, which are global health problems(5).

Poor nutrition, multiparty, abortions, parasitic infections, and consumption of excess tea or coffee directly after meals are found to be associated with anaemia in reproductive age women, studies documented the association of anaemia with maternal morbidity and mortality; reduction of productivity; the occurrence of premature births, low birth weight, fetal impairment, and infant death(6).

Globally, about 11.1% of live births are preterm deliveries, which account for as much as 75-80% of neonatal morbidity and mortality and are associated with physical, psychological, and economic burdens on babies, mothers, and families(7). Risk factors for preterm labour include iron deficiency, iron-deficiency anaemia, and inflammatory conditions brought on by infection or sterile inflammation(8), but the association between maternal anaemia and preterm delivery is still controversial, several studies have shown that maternal anaemia was associated with preterm labour, whereas some studies found no correlation between maternal anaemia and poor pregnancy outcomes including preterm delivery(9).

Patients and Methods

A case-control study was conducted in Salahadeen General Hospital /Gynecology and Obstetrics department during the period from 1st of January to 30th of June 2022. The study was proposed and subsequently approved by the scientific committee of the College of the Medicine/University of Tikrit. Fully informed consent was obtained from the patients verbally after explaining the aim and method of the study thoroughly and ensuring the anonymity and confidentiality of responses.

A convenient sample of 100 pregnant women was included in the current study and consisted of two groups:

1. Case group included 50 pregnant women who had preterm labour.
2. Control group included 50 pregnant women who presented at term labour and matched with the case group regarding age, body mass index (BMI), parity, and abortion.

After the acceptance of the patient to be enrolled in the study, the data was collected through a direct interview and included history, examination, and investigation using a standardized questionnaire with closed-end questions that was prepared by the researcher withrevision of the supervisor after a review of many similar

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articles. The questionnaire is divided into three parts:

Part one: Sociodemographic characteristics, including age, employment, education, and residency.

Part two: Obstetrical, medical, and surgical history, including parity, gravidity, abortions, interpregnancy interval, and booking status during the current pregnancy. In addition to any history of trauma or accident.

Part three: Obstetrical and medical examination, weight, height, blood pressure, pulse rate, respiratory rate, and signs of IDA. In addition to ultrasound examination for detecting exclusion criteria.

Results

A total of 100 pregnant women were enrolled in the current study. Women aged 21-30 constituted the most significant percentage of the sample. Most participating women were living in rural areas, housewives, and had primary or secondary school education, as shown in (Table 1).

Table 1: Sociodemographic distribution of the participants

Characteristic		N	%
Age groups (years)	≤20	33	33.0
	21-30	38	38.0
	≥31	29	29.0
Residency	Urban	40	40.0
	Rural	60	60.0
Occupation	Housewife	66	66.0
	Employed	34	34.0
Education	Primary school	36	36.0
	Secondary school	42	42.0
	College or higher	22	22.0

There were no significant differences between the study groups regarding age, residency, occupation, and educational level(Table 2).

Table2: Sociodemographic distribution of the participants according to the study groups

Sociodemographic characteristics		Study groups		P-value
		Case N (%)	Control N (%)	
Age group	≤20	21 (42.0)	12 (24.0)	0.124
	21-30	15 (30.0)	23 (46.0)	
	≥31	14 (28.0)	15 (30.0)	
Residency	Urban	19 (38.0)	21 (42.0)	0.673
	Rural	31 (62.0)	29 (58.0)	
occupation	Housewife	32 (64.0)	34 (68.0)	0.683
	Employed	18 (36.0)	16 (32.0)	
Education	Primary school	23 (46.0)	13 (26.0)	0.106
	Secondary school	17 (34.0)	25 (50.0)	
	College or higher	10 (20.0)	12 (24.0)	

Chi-Square test

No significant difference was obtained between the study groups regarding the history of preterm labour, abortion, and ANC. As shown in (Table3).

Table 3: Distribution of preterm labor, abortion, and antenatal care according to the study groups

Obstetrical history		Study groups		P-value
		Case N (%)	Control N (%)	
Previous preterm labour	Yes	7 (14.0)	4 (8.0)	0.338
	No	43 (86.0)	46 (92.0)	
Previous abortion	Yes	11 (22.0)	13 (260)	0.640
	No	39 (78.0)	37 (74.0)	
Antenatal care	No	15 (30.0)	12 (24.0)	0.033
	Irregular	25 (50.0)	16 (32.0)	
	Regular	10 (20.0)	22 (44.0)	

There was a significant association between anaemia and preterm labour as 52% of the participants in the case group had anaemia. While only 32% of those in the control group had anemia(Table 4)

Table 4: Association between anaemia and preterm labour

Anaemia	Study groups		P-value
	Case N (%)	Control N (%)	
Had anaemia	26 (52.0)	16 (32.0)	0.043
Did not have anaemia	24 (48.0)	34 (68.0)	

T test

The means of haemoglobin, TIBC, and transferrin saturation were significantly higher in the control group compared to the case group (P-value<0.005). In contrast, serum ferritin was significantly higher in the case group compared to the control group (P-value<0.005). As shown in (Table 5).

Table 5: Distribution of the blood investigation according to the study group

Investigations	Study groups		P-value
	Case Mean (SD)	Control Mean (SD)	
Haemoglobin (mg/dL)	9.8 (1.5)	11.0 (1.1)	**<0.001**
Serum ferritin (ng/mL)	21.6 (1.5)	12.5 (2.1)	**<0.001**
TIBC (mcg/Dl)	380.7 (45.5)	338.4 (41.6)	**<0.001**
Transferrin saturation	14.9 (4.4)	18.5 (1.3)	**<0.001**

t-test

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In thecase group, the age, educational level, and regularity of the ANC significantly impacted the prevalence of anemia (P-values were 0.014, 0.013, and 0.001, respectively), as shown in (Table 6).

Table 6: Risk factors of anemia in pregnancy

Sociodemographic and obstetrical characteristics		Case group		P-value
		Anaemia N (%)	No anaemia N (%)	
Age group	≤20	16 (61.5)	5 (20.8)	**0.014**
	21-30	5 (19.2)	10 (41.7)	
	≥31	5 (19.2)	9 (37.5)	
Residency	Urban	12 (46.2)	7 (29.2)	0.216
	Rural	14 (53.8)	17 (70.8)	
Occupation	Housewife	19 (73.1)	13 (54.2)	0.164
	Employed	7 (26.9)	11 (45.8)	
Education	Primary school	16 (61.5)	7 (29.2)	**0.013**
	Secondary school	4 (15.4)	13 (54.2)	
	College or higher	6 (23.1)	4 (16.7)	
Previous abortion	Yes	7 (26.9)	4 (16.7)	0.382
	No	19 (73.1)	20 (83.3)	
Previous preterm	Yes	4 (15.4)	3 (12.5)	0.769
	No	22 (84.6)	21 (87.5)	
Antenatal care	No	14 (53.8)	1 (4.2)	**0.001**
	Irregular	9 (34.6)	16 (66.7)	
	Regular	3 (11.5)	7 (29.2)	

Chi-Square test

Discussion

Minimising the risks of mortality, morbidities, and the costs associated with preterm birth is reliant on accurate prediction, appropriate decision-making and timely intervention[(10)].At the same time, IDA is associated with increased maternal and perinatal morbidity and mortality, and long-term adverse effects on the newborn[(11)]. Best to our knowledge, this is the first study in Iraq focused on the association between preterm labour and anaemia during pregnancy. The main finding of the current study was a significant association between anaemia and the incidence of preterm labour. The same results were obtained by another study that was done in Tanzania as anaemia was significantly associated with preterm labour. In addition, the risk of preterm labour was significantly correlated with the severity of anaemia[(12)]. In India, Shannon

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considered anaemia as one of the main risk factors of preterm labour[13]. In agreement with the current study, Aasia et al. reported that moderate to severe anaemia (9 to 10gm/dl) has been associated with a 2-3 fold increased risk of preterm labour[14]. Wang et al. concluded that severe anaemia and high haemoglobin concentration were both associated with an increased risk of preterm deliveries and low birth weight[15]. All the parameters were compatible with the diagnosis of anaemia except the serum ferritin as it was elevated in the case group compared to the control group., haemoglobin and transferrin saturation were significantly lower in the case group than in the control group. While the serum ferritin and TIBC were significantly higher in the control group than in the case group. In agreement with the current study, Ayesha et al. concluded that the serum ferritin level of control participants was significantly lower than pregnant women with preterm labour[16]. Khaled et al. revealed that serum ferritin is highly elevated in cases of preterm labour, so it could be proposed as a potential helpful marker to predict preterm labour[17]. that was done in Iran concluded that the serum ferritin level provides appropriate discrimination in predicting preterm delivery[18]. This might be related to the inflaamtory process associated with preterm labour as a cause or consequence as serum ferritin is one of the inflammatory markers in the body. There was a significant association between anaemia and the age of the pregnant women as those with an age of less than 20 years composed more than half of the pregnant women with anaemia in the case group. The same results were obtained in another study that was done by Millicenta et al. in Ghana[19]. In agreement, that anaemia, preterm delivery, and low birth weight were more prevalent among teenagers than among adult pregnant women. This indicates the need for enhancing family welfare measures to delay the age at first pregnancy, thereby reducing the multiple complications that may occur in the young mother and her newborn baby[20]. In the current study, the low educational level was significantly associated with anaemia. The same results were obtained in another study that was done in Ethiopia byTadesse et al[21]. In contrast, another study reported an insignificant association between anaemia during pregnancy and educational level[22].

Conclusion

Anaemia was considered a significant risk factor for preterm labour. The age of the pregnant women, educational level, and the frequency of antenatal visits were significantly impacted the incidence of anaemia during pregnancy.

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