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Factors Associated with Anemia in Pregnant Women Attending Primary HealthCare Centers in Al – Hilla City

AseelHafedh Jawad*1; Dr. Rusul Sabah Ghazal *2; Ishraq Ahmed chiad*3

[1]*Master degree students / Middle Technical University / Iraq
[2]*Ph.D. Assist. Prof. / Middle Technical University / Iraq
[3]*Assist . Prof./ Middle Technical University / Iraq

Abstract:

Background: The assessment of risk factors for anemia in pregnant women is vital to the risk of health complications that may affect both the pregnant mother and the fetus, and at the same time prevention is possible.

Objectives: To assess the risk factors for anemia among pregnant women attending primary health care centers in Al-Hillacity, predict the variables that contribute to the risk factors for anemia among pregnant women and find out the relationship between risk factors for anemia and these variables.

Materials and Methods: A case control study design conducted on a convenient sample of (700) pregnant women include (350) pregnant women with anemia (case group) and (350) pregnant women do not suffer of anemia (control group)selected from 22 primary health care centers in Al-Hilla city (First Al-Hilla Sector (11)&Second Al-Hilla Sector (11))during a period from 1st December 2020 ending on 30th May2021. The data were collected through the utilization of the developed questionnaire and by means of structured interview technique with the subjects who were individually interviewed in the primary health care center. Content validity and reliability of the questionnaire determined through a pilot study, descriptive and inferential statistic is used to analyze the data.

Result: the study showed that the highest percentage in case-control studies was (29.4% &32%) respectively their age range between (20-24) years, with regard to educational qualifications, the highest percentage (37.4%, 46%) were primary school graduates. And (77.4%, 84.3%) of housewives. Most pregnant women (80.6%, 81.1%) live in urban areas. (63.7% & 60.9%) were economically have enough income monthly from the point of view for both groups, the socio-economic status as the highest percentage (60.6% &66.3%) were of middle socio-economic level for both case study and control groups respectively. Also, the highest percentage of the study group was (54%) had mild anemia. housewives had 1.5 times risk of anemia during pregnancy (OR=1.564).women with heavy menses had 6.6 times risk of anemia during pregnancy (OR=6.631), primipara are protected from been anemic (OR=0.692), having one or more stillbirths have 2.8 times risk of being anemic during pregnancy (OR=2.847), having one or repeated abortion carry risk of 1.6 times to have anemia during pregnancy (OR=1.563), having twin pregnancy have 2.3 times risk of being anemic during pregnancy (OR=2.361) and short birth interval of less than 2 years carry risk of about 1.5 times for having anemia during

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pregnancy (OR=1.454).Pregnant women with history of previous operations (mainly Caesarean Section) were at risk of 2.4 times to have anemia during pregnancy (OR=2.38) and also risk if 21 times if she had a history of parasitic infections (intestinal worm and malaria) (OR=21.15).

Recommendations: establishing health education program regarding the enhances of pregnant women's knowledge about effects of anemia during pregnancy and its prevention among mothers with low education, adolescent mothers and women of reproductive age in general. And teach women at child bearing age good long – term dietary habits as a part of an overall approach to health promotion.

Key words: Anemia, Pregnancy, Risk factors.

Introduction:

Anemia in pregnancy is an important global public health problem. The World Health Organization (WHO) defines anemia in pregnancy as having hemoglobin (Hb) concentration of less than 11 g/d L. [(1)] The WHO estimates 40% of pregnant women worldwide are anemic, with iron deficiency anemia being the most common form. [(2)]According to WHO reports, anemia affect (35-75) % of pregnant women in developing countries opposed by about 18% in developed ones. [(3)] The last report of the World Bank Group (WBG) estimates the prevalence of Anemia among pregnant women in Iraq is nearly 38%. [(4)] Anemia in pregnancy is also a contributing factor for maternal death, still births, low birth weight, and impairment of fetal development. [(5)] The causes of anemia during pregnancy in developing countries are multifactorial; these include micronutrient deficiencies of iron, folate, and vitamins A and B12 and anemia due to parasitic infections such as malaria and hookworm or chronic infections like Tuberculosis (TB) and Human Immunodeficiency Virus (HIV). [(6)]

Other factors such as socio-demographic and economic factors such as place of residence and educational level also play important roles. [(7)] Iron deficiency is globally the most prevalent form of malnutrition, and is the main cause of disease among young women and pregnant Women in developing countries. [(8)]

Objectives of study: To assess the risk factors of anemia among pregnant women. And to predict variables in contribute with risk factors of anemia among pregnant women.

Materials and methods:

Study design: Case control study design with a convenient sample of pregnant women attending the primary health care centers in Al – Hilla city.

Duration of the Study: The data collection started from 1st December 2020 ending on 30th May 2021. **Place of study:** The study was conducted in Al-Hilla city. which including 22 primary health care centers in First Al- Hilla Sector (11) &Second Al- Hilla Sector (11) .

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Study Sample: Non-probability (convenient sampling) of (700) cases include (350) pregnant woman with anemia (case group) and (350) pregnant do not suffer of anemia (control group).

Inclusion and Exclusion criteria of study:

Inclusion Criteria: All pregnant women who are attending to primary health care centers in Al-Hilla city.

Exclusion Criteria:(1) pregnant women with anemia before pregnancy. (2) Pregnant women with (Thalassemia, sickle cell anemia, G6PD (fauvism), Hemophilia).

Data Collection: The data were collected through a questionnaire form which consisted of Socio-Demographic characteristics, Reproductive History, Laboratory Tests, previous and Current Health History.

Statistical Analysis: Analysis of data was carried out using the available statistical package of SPSS-27 (Statistical Packages for Social Sciences- version 27). Data were presented in simple measures of frequency, percentage, mean, standard deviation, and range (minimum-maximum values). The significance of difference of different percentages (qualitative data) were tested using Pearson Chi-square test (χ^2-test) with application of Yate's correction or Fisher Exact test whenever applicable. Statistical significance was considered whenever the P value was equal or less than 0.05. An odds ratio (OR) is a measure of association between an exposure and an outcome.

Results and discussion:

Table 1: The distribution of studied sample (case study and control groups) according to age.

Age (years)		Case study group		Control group		P value
		No	%	No	%	
Age (years)	<20years	82	23.4	79	22.6	0.699
	20-24	103	29.4	112	32.0	
	25-29	88	25.1	81	23.1	
	30-34	32	9.1	40	11.4	
	≥35years	45	12.9	38	10.9	
	Mean ±SD (Range)	24.8±6.9 (14-45)		24.7±6.6 (13-42)		
Categorizing age	<20years	82	23.4	79	22.6	0.649
	20-34	223	63.7	233	66.6	
	≥35years	45	12.9	38	10.9	

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*Significant difference between percentages using Pearson Chi-square test at 0.05 level

The highest percentage (29.4 &32%) were within age group 20-24 years old in both case study and control groups respectively. After categorizing the age into both extreme high-risk groups (below 20 years and equal /or above 35 years) a non-significant association was found (P=0.649) although there was slightly higher rate of anemia among young (<20 years) and old (>35 years) pregnant women to have anemia during their pregnancy (23.4% and 12.9%) in young and old pregnant women respectively).

In comparison with some similar to other studies in to what had been reported in done by Somali Region, East Ethiopia, were (49.1 %) of participant were age group (20 - 24) years old. [9] Also agree with other studies in BaqubaGovernorate / Iraq , (30% and 33.3%) respectively for both study and control groups their age (25-29) years old. [10]

Table 2:The distribution and association between studied sample (case study and control groups) according to the socio-demographical characteristics and risk factor of anemia during pregnancy

Socio-demographic characteristics		Case study group		Control group		P value	OR	95%CI
		No	%	No	%			
Level of education of pregnant	Illiterate	25	7.1	27	7.7	0.136		
	Read & write	28	8.0	16	4.6			
	Primary	131	37.4	161	46.0			
	Secondary	73	20.9	71	20.3			
	Institute	26	7.4	21	6.0			
	College & higher	67	19.1	54	15.4			
Level of education of husband	Illiterate	28	8.0	29	8.3	0.141		
	Read & write	23	6.6	14	4.0			
	Primary	138	39.4	168	48.0			
	Secondary	88	25.1	69	19.7			
	Institute	23	6.6	27	7.7			
	College & higher	50	14.3	43	12.3			

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Occupation of pregnant	**Housewife**	271	77.4	295	84.3	0.021*	1.564	1.07-2.29
	Employed	49	14.0	36	10.3			
	Student	29	8.3	16	4.6			
	Other business	1	0.3	3	0.9			
Occupation of husband	**Gover employee**	83	23.7	63	18.0	0.773	1.087	0.62-1.91
	Self-employee	5	1.4	3	0.9			
	Worker (Gainer)	237	67.7	257	73.4			
	Retired	-	-	2	0.6			
	Unemployed	25	7.1	25	7.1			
Residence	**Rural**	68	19.4	66	18.9	0.848	1.038	0.71-1.51
	Urban	282	80.6	284	81.1			
Type of family	**Extended**	142	40.6	140	40.0	0.878	1.024	0.76-385
	Nuclear	208	59.4	210	60.0			
Family income in month	**Not enough**	37	10.6	27	7.7	0.150		
	Enough to some extent	90	25.7	110	31.4			
	Enough	223	63.7	213	60.9			
Socio-economic status	**Low**	53	15.1	42	12.0	0.262		
	Middle	212	60.6	232	66.3			
*Significant difference between percentages using Pearson Chi-square test at 0.05 level								

the highest percentage (37.4% & 46%) of both case study and control groups respectively were primary school graduate, also the highest percentage of case study and control groups husband level of education were (39.4%) and (48%) respectively were primary school graduate, there were no statistical significance between percentages (P=0.136 & 0.141, respectively). The studied samples occupation, the majority were housewives (77.4% & 84.3%) in both case study and control group, while the husband's occupation refers to worker were accounted of both groups as (67.7 &73.4%) in case study and control group, respectively. Most of studied sample (80.6%) of case study group and (81.1%) in (control groups) were living in urban areas. The highest percentage (59.4% &60%) were nuclear family of both case study and control groups and the lowest percentage for extended family type for both groups. The study also showed that the highest percentage (63.7% &60.9%) were economically have enough income monthly from

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the point of view for both groups (case study and control) reflecting the socio-economic status as the highest percentage (60.6% &66.3%) were of middle socio-economic level for both case study and control groups respectively.Association between Socio-demographic characteristics and risk factor of anemia during pregnancy, women occupation as housewives had 1.5 times risk of anemia during pregnancy (OR=1.564), while other factors did not reach the level of significance in the current study.

A cross sectional study in Ethiopia to assessing women's risk factors of iron deficiency anemia. Findings depicts that (30.5%) of mothers aged 23-27 years, (39.1%) were primary school educated, (46.1%) were housewives, (60.9%) were lives in small family, (46.1%) at middle level of economic status and lives in urban areas. (11)

The same result was documented in retrospective casecontrol study done in ,it was observed that pregnant housewives. were two times more likely to develop anemia than who have job, the possible reason may be that housewives may have financial constraint, work load and may not have early access to health care services. (12)

Table 3: The distribution and association between studied sample regarding to the reproductive history characteristics and risk factor of anemia during pregnancy.

Reproductive History		Case study group		Control group		P value	OR	95%CI
		No	%	No	%			
Age at first menarche	**10**	27	7.7	12	3.4	0.096		
	11	40	11.4	30	8.6			
	12	100	28.6	109	31.1			
	13	69	19.7	72	20.6			
	14	62	17.7	72	20.6			
	15	24	6.9	34	9.7			
	=>16	28	8.0	21	6.0			
Age at first pregnancy	**<20years**	101	28.9	99	28.3	0.832		
	20—29	193	55.1	189	54.0			
	≥30years	56	16.0	62	17.7			
Have heavy menstruation	**Yes**	47	13.4	8	2.3	0.0001*	6.631	3.09-14.26
	No	303	86.6	342	97.7			
Gravidity	**One**	168	48.0	189	54.0	0.063		

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	Two-Four	132	37.7	125	35.7			
	5 & more	50	14.3	36	10.3			
Parity	**Primipara**	168	48.0	200	57.1	0.015*	0.692	0.514-0.933
	Multipara	182	52.0	150	42.9			
Stillbirth	**One & more**	42	12.0	16	4.6	0.0001*	2.847	1.568-5.167
	None	308	88.0	334	95.4			
Abortion	**Once or recurrent**	71	20.3	49	14.0	0.027*	1.563	1.049-2.329
	None	279	79.7	301	86.0			
Have twin pregnancy	**Yes**	7	2.0	3	0.9	0.203	2.361	0.605-204
	No	343	98.0	347	99.1			
Number of living children	**Null**	174	49.7	206	58.9	0.0001*		
	One-four	175	50.0	134	2.9			
	5 & more	1	3	10	38.3			
Current gestational age	**First trimester**	100	28.6	87	24.9	0.013*		
	Second trimester	151	43.1	189	54.0			
	Third trimester	99	28.3	74	21.1			
The period between current and previous pregnancy (Inter-pregnancy interval)	**<2year**	131	37.4	102	29.1	0.020*	1.454	1.06-1.995
	≥2years	219	62.6	248	70.9			

*Significant difference between percentages using Pearson Chi-square test (χ^2-test) at 0.05 level.

The results show of both groups were(28.6%) of case study group and (31.1%) of control group did have their menarche (first menses) at age of 12 years. Also showed that about half of the pregnant women in case study group (55.1%) had their first pregnancy at age (20-29) years old in comparison to (54%) of the control group. Regarding have a heavy menses in case study group reported (13.4 %) in comparison to control group (2.3 %). These results were similar to other studies found in Babylon Governorate / Iraq, were (46. %) in study group of participants were in the age at first menarche 12 years old [(13)], and the results is similar to what had been reported in Durame Town, were (65.8 %), (87.8 %) study and control groups respectively were didn't have a heavy menstruation. [(14)]The results, also shows that nearly half of each group their

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first pregnancy and were included in the study (being pregnant once only, gravida one) (48% & 54%) of case study and control group). In addition, a high percentage of case study group were multipara (52.0%) compared to (42.9%) in the control group. The results of this study is different with other study found in Waist governorate, were (46.7 %) of study group had three and more pregnancies.[15]Also disagree with other studies done in Babylon teaching hospital , were the majority of the study sample (59.0%) were gravidity numbers (3-4).[16] And agree with study which reported regarding to Parity, the highest percentage (36.7%) for study group have (1-2) , and (46.7%) in control group were primipara.[10] A higher percentage of case study group (88.0%) didn't had history of stillbirth when compared to that reported in control group (95.5%). Whereas a history of single or recurrent abortion of case study group (20.3%) gave in comparison to only (14.0%) in control group. Only 7 pregnant women in case study group (2.0%) gave a history of giving birth to twins in comparison to 3 women (0.9%). Concerning the number of children, (49.7%) of case study group and (58.9%) of control group have no children (this is their first pregnancy mostly), while the rest have more than one child. The result agree with other studies that the average number of pregnancies about (45.2%) of the mother are in their second pregnancy and (90%) of them didn't have stillbirth. [17] Also the result is similar to what had been reported in West Ethiopia , were (85.3 %) & (91 %) of participant didn't have abortion.[18]The result of this study is disagreed to what had been reported in Ramadi city were (20%) in study group of participants have twin pregnancy.[19] Also, disagree to what had been reported Durame Town,that found the highest percentage (52.3%) of study group for >4 children but the highest percentage of control group (69.8 %) $\leq$ 4 children .[14]

The case study group were from different gestational age categories, (28.6%) as first, (43.1 %) as second and (28.3%) as third trimester, while different percentages were seen in the control group, (24.9%), (54.0%) & (21.1%) for first, second and third trimester respectively. Finally, the period between current and previous pregnancy (inter-pregnancy interval) was found mainly as 2-year period and more (62.6% & 70.9%) for case study group and control group. The result of this study is similar to what had been reported in Somali Region, East Ethiopia, were (47.4 %) of study and control groups of participants were at second trimester in current gestational age. [9]While, the results are similar to what had been reported were (42.2 %) in study group of participants answered (1 year) period between current and previous pregnancy. [16] But other results are disagreed to what had been reported the highest percentage was (61%) of study and (71 %) of control group of participants answered ($\geq$ 2 year) about period between current and previous pregnancy. [18] The finding of this study is consistent with previous studies conducted in southern and southeast Ethiopia which showed that having heavy menstrual flow was more likely to develop anemia. [20] The possible reason may be that heavy menstrual blood flow leads a woman to heavy blood loss, which in turn leads to anemia. Also is advocated the result of this study with that found anemia among multipara pregnant women more than primipara. [21]found that pregnancies with parity more than 3 were 2 times more likely to be anemic than those with parity <3. [22] The finding of this study is consistent with study which found the early iron deficiency anemia was a significant determinant of anemia at pregnancy in women with multiple gestations. [23] Also, the finding of this study is consistent with study which found the pregnant mother whose birth interval was less than two years were five times more likely to develop anemia than whose birth interval reported to be greater than two years. [24]

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Table 4: Distribution of studied sample according to their hemoglobin level in blood.

Hemoglobin level	case study group		Control group	
	No	%	No	%
< 7.0 g / dl (Severe)	11	3.1	-	-
7.0 -9.9 g / dl (Moderate)	150	42.9	- -	- -
10 – 11.4 g / dl (Mild)	189	54.0	-	-
11.5 – 12.7 g / dl			291	83.1
12.8 – 14.0 g / dl			59.0	16.9
Mean ±SD(Range)	9.7±0.9 (7.2-11.4)		12.8±0.8 (11.5-16.0)	

*Significant difference between percentages using Pearson Chi-square test (χ^2-test) at 0.05 level.

The prevalence of anemia (Hemoglobin levels <11.0 g / dl in women), in case study group was (54%) had mild anemia (hemoglobin from 10-11.4 g / dl) and (42.9%) had moderate anemia (hemoglobin level 7.0-9.9 g/ dl) , but only (3.1%) were severely anemic (hemoglobin ≤ 7.0 g / dl) . For mean hemoglobin level in case study group about 9.7 ± o.9 (7.2-11.4) was mild level of anemia. While (350) non-anemic pregnant women were (100%) of control groups (hemoglobin ≥11.5 g / dl) and the mean hemoglobin level about 12.8 ± 0.8 (11.5-14.0). The finding of the present study is agreement with findings where mild Anemia was predominant and seemed to be expected in Iraq (Khalil *et al*., 2017). [25]

Table 5: The distribution and association of studied sample regarding to the previous and current health history and risk factor of anemia during pregnancy.

Previous and current health history		Case study group		Control group		P value	OR	95%CI
		No	%	No	%			
Have previous operations	Yes	96	27.4	48	13.7	0.0001*	2.38	1.62-3.49
	No	254	72.6	302	86.3			
Had uterine curettage	Yes	73	20.9	55	15.7	0.078	1.41	0.96-2.08

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	No	277	79.1	295	84.3			
Get morning sickness (nausea & vomiting) during a day hours	**Yes**	205	58.6	219	62.6	0.279	0.85	0.62-1.146
	No	145	41.4	131	37.4			
Had a parasitic infection (intestinal worms and malaria)	**Yes**	20	5.7	1	0.3	0.0001*	21.15	2.82-158.5
	No	330	94.3	349	99.7			
Suffer from recurrent urinary tract infections	**Yes**	263	75.1	251	71.7	0.305	1.19	0.852-1.67
	No	87	24.9	99	28.3			
*Significant difference between percentages using Pearson Chi-square test (χ^2-test) at 0.05 level.								

Revealed that a high rate of positive history of previous operation (mostly Caesarean section) the case study group (27.4%) in comparison to control group (13.7%). The same was found for history of uterine curettage; (20.9%) in case study group in comparison to (15.7%) for the control group). The result of this study is similar to what had been reported in East Ethiopia that found highest percentage of both the study and control group (97 .4 %) & (98 .2 %) of participant didn't have pervious operation .[9] Regarding hyperemesis gravidarum (morning sickness as nausea and vomiting during a day hours) were obtained (58.6%) for case study group versus (62.6%) for control group. The results are similar to what had been reported in a study were (67 %) & (76.7%) of participants they get morning sickness (nausea and vomiting). [18]

About parasitic infection present there was a rate of infection among pregnant women with anemia (5.7%) when compared to control group (0.3%) , while (75.1%) versus (71.7%) of case study groups and were suffering from recurrent urinary tract infection . The result of this study is Contrary to what had been reported in East zone of Tigray , Ethiopia were (99% &41.4%) have a parasitic infection .[26] While , other result is similar with other study done by Maternity Teaching Hospital / Erbil City , were (62.5%) of study group suffer recurrent urinary tract infection .[27] The association between the previous health and current health history and risk factor of anemia during pregnancy**,** women with history of previous operations (mainly Caesarean Section) were at risk of 2.4 times to have anemia during pregnancy (OR=2.38) and also risk if 21 times if she had a history of parasitic infections (intestinal worm and malaria) (OR=21.15) .The finding of this study is in agreement with a study which state excessive blood loss from previous caesarean sectionsleads to iron storagedepletion and causes iron deficiency anemia which commonly occurs in pregnant womenwith women who give birth by caesarean section .[28]Also, the finding is in agreement with a which found the mothers who were infested by parasitic infection were 3.7 times more likely to develop anemia than those who were not infested by parasitic infection during the current pregnancy. Might be due to blood loss caused by parasitic infestations that might put mothers at high risk of iron deficiency anemia. [29]

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Conclusions:

The present study concluded thatthere was a significant association between risk factor of anemia during pregnancy and; Socio-demographic characteristics of housewives occupation, reproductive history characteristics (women with heavy menses , primipara , having one or more stillbirths and abortion, twin pregnancy and short birth interval of less than 2 years), and finally previous and current health history**,** women with history of previous operations (mainly Caesarean Section) and also risk if she had a history of parasitic infections (intestinal worm and malaria).

Recommendations:

1-Health education program regarding the enhances of pregnant women's knowledge about effects of anemia during pregnancy and its prevention that apply by professionals in maternal child health units especially among mothers with low education, adolescent mothers and women of reproductive age in general.

2- Health education about the importance of intervals between pregnancies on mother and fetal health.

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