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Prevalence of Anemia among Pregnant Women Attending Antenatal Clinic at Family Health Center

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***Abstract*---**Anemia is the most prevalent cause of hematological problem that occurs more frequently during pregnancy. According to World Health Organization data, up to 56% of all women in underdeveloped nations are anemic. Anemia is readily defined by measuring hemoglobin concentrations and evaluating a peripheral blood smear for distinctive red blood cell abnormalities. Iron supplementation is recommended throughout pregnancy to avoid problems. This was a study done in Shebin Elkom Health Center from April 2021 to January 2022. The study was conducted on 300 pregnant women at obstetrics and gynecology department. The study consisted of two phases: the first phase was a cross sectional study and the second phase was an interventional prospective study. There was significant difference between anemic and non-anemic patients regarding all CBC results except RBCs count. Most women were normal (68%), mild, moderate and severe anemia were found in 30m 1.33 and 0.67 percent of participants. There was a significant correlation between anemia and second trimester of pregnancy, previous diagnosis with anemia, piles, PCV, MCHC and long menstruation. There was a significant improvement of anemia and increase in Hb level after iron supplementation. Although anemia is a common preventable problem, the prevalence of anemia in pregnant women in our study was 32%; there was an obvious improvement in hemoglobin concentration in anemic pregnant women after supplementation of iron by the dose recommended by Egyptian practice guidelines for family physicians.

***Keywords*---**anemia, pregnant women, pregnancy, antenatal clinic.

Introduction

Anemia is defined as a loss of functional red blood cells (RBCs), which results in a lack of oxygen-carrying capabilities and distinctive problems during life. RBCs are

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created in the bone marrow. They have a lifespan of around 120 days. For erythropoiesis, the body requires iron, vitamin B12, and folic acid, among other things. Anemia arises when one or more of these components are deficient, or when RBCs are lost in greater numbers. Any patient with a haemoglobin (Hb) level of less than 11 gm/dl to 11.5 gm/dl at the onset of pregnancy would be considered anaemic (1).

Anemia affects 41.8 percent of pregnant women worldwide, with Africa having the greatest frequency (57.1 percent), corresponding to 17.2 million women. Anemia is seen as a serious public health issue in Egypt, where it affects more than 40% of pregnant women (2).

Anemia in pregnant women has serious ramifications for their health, social development, and economic development. Anemic pregnant women, especially those with severe anaemia, are at risk of poor physical activity, increased maternal morbidity, and death. Furthermore, both pregnant women and their newborns face poor outcomes such as foetal anaemia, low birth weight (LBW), preterm delivery, intrauterine growth restriction, and perinatal mortality (3). Anemia during pregnancy is caused by a combination of factors. Iron, folate, vitamin B12, and vitamin A deficiencies, as well as intestinal parasite infections, malaria, and chronic sickness, have been identified as the leading causes of anaemia in pregnant women (4).

Anemia is mainly avoidable and readily cured in the majority of cases if diagnosed early. Treatment of the underlying causes, restoration of haemoglobin concentrations to normal levels, and prevention and treatment of consequences are all components of effective anaemia therapy (5).

After the first three months of pregnancy, all pregnant women should get routine iron and folic acid supplements. The dosage is 200 mg ferrous fumarate or sulphate and 300 g folic acid, administered once day. If the haemoglobin level does not rise after two weeks, more testing will be performed. A rich iron diet, including red meats, fortified cereals, and beverages, should be encouraged. Intravenous iron should be used only in extreme cases of iron insufficiency, if the woman is refractory to oral iron therapy, or when iron replacement is necessary quickly (6). The present study is aimed to focus on the most important risk factors predisposing one to the development of anemia during pregnancy to improve the health status of pregnant women and overcome this problem.

Material and Methods

This was a study done in Shebin Elkom Health Center from April 2021 to January 2022. The study was conducted on 300 pregnant women at obstetrics and gynecology department. The study consisted of two phases: the first phase was a cross-sectional study and the second phase was an interventional prospective study.

We included all pregnant female attending antenatal care clinic at family health center in the period of the study. Exclusion criteria were 1.Patient with known haemoglobinopathies before pregnancy with repeated blood transfusion. 2.

Patient taking blood transfusion in the last three months for any other causes. 3. Multiple pregnancies. 4. Seriously ill. 5. With mental disorders. 6. With chronic disease.

Sample size: Assuming that total number of population size is 1000(pregnant women attending family health center), prevalence of anemia among pregnant women in a study done on Southeast Ethiopia which was 20 %. (7), power 80 %, confidence interval (CI) 95%, so least sample size was 300 pregnant women.

Basal evaluation of the studied group

The semi structured validated questionnaire used included the following: socioeconomic data according to the El-Gilany socioeconomic scoring system (8),the relevant obstetric, dietary, menstrual history, history of anemia, and conditions precipitating anemia, in addition to assessment of the hemoglobin level in the first visit. Intervention phase All participants received health education message about adequate diet, avoiding excessive salt, and the importance of compliance to nutrient supplementation. According to National Practice Guidelines for Family Physicians, anemic pregnant women diagnosed with mild and moderate anemia (Hb = 8–11 g/dl) received curative doses of ferrous fumarate (200 mg three times daily for 4 weeks) and patients with severe anemia (Hb 11 g/dl) received a preventive dose of ferrous fumarate (200 mg once per day).

Reassessment and follow-up visit

Hemoglobin assessment was repeated 4 weeks after iron supplementation to estimate the improvement in the hemoglobin percent in the anemic group. There was a drop out of six cases in the post-intervention phase.
Questionnaire validity: The questionnaire was submitted to a panel of experts in the field of the family medicine to test the content validity. Modification was carried out according to the panel‘s judgment on clarity of sentences and appropriateness of content. Also, it was translated using a back translation technique. An expert translated the questionnaire from English to Arabic. The Arabic version of the questionnaire was translated back to English by a bilingual individual. The back-translated and original versions of the questionnaire were compared with attention given to the meaning and grammar.

Pilot study: Before starting to collect the final data, a pilot study was conducted on 10 % of the sample size to test the feasibility of the study, as well as the clarity of the tools and to estimate the time needed to fill each questionnaire. The pilot study findings showed that the questionnaires were clear and relevant. The tools were finalized and made ready for use. The pregnant women included in pilot study were included in the main sample.
Field work: Women were interviewed by the researcher who introduce herself and explain briefly to them the aim of the study. All questionnaires were answered by respondents, and the time needed ranged from 15 to 25 minutes. Hemoglobin concentration g/dl was done for all 278 pregnant females to diagnose IDA among pregnant women. Full hemogram was done for pregnant females with Hb level less than 11 g/dl with three degrees: Mild (10-10.9g/dl), Moderate (7.0-9.9g/dl),

and Severe (<7.0g/dl) (WHO 2011). Full hemogram include (Hemoglobin concentration g/dl, red cell count, leucocytes, platelet count, PCV, MCV, MCH, MCHC). Full hemogram was done. The fieldwork was executed in two days per week. The work was completed in 6 months.

Statistical analysis

IBM-SPSS version 24 was used for data analysis (May 2016). Kristall-Wallis and Wilcoxon's tests, as well as Spearman's correlation and logistic regression analysis, were used to determine statistical significance. Based on the type of data it contained, each variable was analysed (parametric or not). We considered results statistically significant if the P-values were less than 0.05. (five percent).

Ethical consideration

The Menofia Faculty of Medicine committee for medical research ethics formally approved the study. A written consent form was obtained from all participants, after simple and clear explanation of the research object, procedure, and the liberty to drop out.

Results

Table 1
Prevalence of anemia among the studied pregnant women

	Number (N (%))
Normal	204 (68%)
Mild Anemia	90 (30%)
Moderate Amenia	4 (1.33%)
Severe Anemia	2 (0.67%)

Most women were normal (68%), mild, moderate and severe anemia were found in 30m 1.33 and 0.67 percent of participants.

Table 2
Comparison between anemic and nonanemic pregnant women regarding the sociodemographic characteristics

Sociodemographics	Anemic (n=96) (n (%))	Non-Anemic (n=204) (n (%))	P-Value [1]
Age (Years)			
20-25	47 (48.96)	109 (53.43)	0.725
26-30	29 (30.21)	59 (28.92)	
>30	20 (20.83)	36 (17.65)	
Education			
High Education	25 (26.04)	96 (47.06)	
Secondary Edu.	39 (40.63)	80 (39.22)	0.001
Illiterate and primary	32 (33.33)	28 (13.73)	
Occupation			
Government employees	10 (10.42)	105 (51.47)	0.0001

Nongovernmental	20 (20.83)	23 (11.27)	
House wives	66 (68.75)	76 (37.25)	
Socioeconomic level			
High	8 (8.33)	84 (41.18)	0.0001
Middle	16 (16.67)	79 (38.73)	
Low	72 (75)	41 (20.1)	
Gravidae status			
Multigravida	58 (60.42)	94 (46.08)	0.02
Primigravida	38 (39.58)	110 (53.92)	
Inter pregnancy interval (Months)			
< 12	35 (36.46)	59 (28.92)	0.031
12-24	33 (34.38)	53 (25.98)	
>24	28 (29.17)	92 (45.1)	
Previous Miscarriage	33 (34.38)	50 (24.5)	0.75

1: Chi square test
P > 0.05 non-significant
P < 0.05 significant
P < 0.001 Highly significant.

There was high significant difference between anemic and non-anemic pregnant women regarding education, occupation, socioeconomic level, gravida and interpregnancy interval.

Table 3
Relation between anemia with lab investigation CBC

Lab Investigation CBC	Anemia		P-value [2]
	Non-Anemic (n=204) Mean ± SD.	Anemic (n=96) Mean ± SD.	
PCV (%)	35.0 ± 1.53	30.70 ± 2.56	0.001
RBCs (X10^6/uL)	4.70 ± 0.21	4.55 ± 1.36	0.1247
MCV (Fl)	74.0 ± 8.65	70.77 ± 17.73	0.034
MCH (Pg)	23.8 ± 1.23	22.73 ± 4.39	0.0014
MCHC (g/dl)	33.0 ± 1.65	30.52 ± 1.77	0.0001
RDW (%)	13.30 ± 1.52	12.90 ± 0.79	0.0158
WBCs (X10^3/uL)	13.60 ± 1.46	7.14 ± 2.01	0.0001
Platelets count (X10^3/uL)	321.0 ± 43.85	259.33 ± 96.41	0.0001

2: Student t-test
P > 0.05 non-significant
P < 0.05 significant
P < 0.001 Highly significant.
PCV: Packed cell volume
RBCs: Red blood cells
MCV: Mean Corpuscular Volume
MCH: Mean corpuscular Hemoglobin
MCHC: mean corpuscular hemoglobin concentration

RDW: Red Cell Distribution Width
WBCs: White Blood Cells

There was significant difference between anemic and non-anemic patients regarding all CBC results except RBCs count.

Table 4
Logistic regression for predicting different variables related to the presence of anemia among the studied groups

Predictors	OR	95% CI	P-Value
Middle socioeconomic standard	1.8	0.78-5.4	0.082
Low socioeconomic standard	18.6	5.2-60.2	0.1
Second trimester of pregnancy	6.54	2.92-22.1	0.0001
Red meat intake	0.15	0.01-0.05	0.24
Vegetables			
Rarely intake	3.25	0.1-115	0.12
1-3 times weekly	0.52	0.01-25	0.703
Milk			
Rarely intake	0.031	0.001-0.159	0.352
1-3 times weekly	0.624	0.03-26.4	0.503
4-6 times weekly	0.102	0.001-8.1	0.075
Ever diagnosed as anemic	16.95	6.2-55	0.0001
Ever had peptic ulcer	2.3	1.1-6.3	0.059
Ever had piles	12.9	6.8-28.7	0.0001
Long menstruation	13.9	5.6-38.9	0.0001
PCV (%)	0.498	0.314–0.785	0.003
MCV (Fl)	0.998	0.935–1.088	0.682
MCH (Pg)	0.902	0.7738–1.149	0.520
MCHC (g/dl)	0.413	0.276–0.812	0.0065
RDW (%)	0.483	0.104–1.858	0.259
WBCs (X10^3/uL)	0.0	0.0	0.883
Platelets count (X10^3/uL)	0.989	0.986–1.002	0.204

P > 0.05 non-significant
P < 0.05 significant
P < 0.001 Highly significant.
PCV: Packed cell volume
RBCs: Red blood cells
MCV: Mean Corpuscular Volume
MCH: Mean corpuscular Hemoglobin
MCHC: mean corpuscular hemoglobin concentration
RDW: Red Cell Distribution Width
WBCs: White Blood Cells

There was a significant correlation between anemia and second trimester of pregnancy, previous diagnosis with anemia, piles, PCV, MCHC and long menstruation.

Table 5
Effect of oral iron treatment on the hemoglobin level in the studied anemic group

Parameter	First visit	Second visit	P-Value
Hb%	9.95 ± 0.52	10.45 ± 0.45	0.0001
Anemia	96 (32%)	58 (19.3%)	0.0001

There was a significant improvement of anemia and increase in Hb level after iron supplementation.

Discussion

Anemia can be considered the most common cause of hematological disorder that more frequent occurs in pregnancy (9). In developing countries, anemia is a cause of serious different disease, besides many other important effects on the pregnant and the fetus it contributes significantly high maternal mortality and morbidity (10). According to world Health Organization statistics, up to 56% of all women living in developing countries are anemic the most common cause of anemia in pregnant woman is lack of iron (ferritin deficiency). Less than that, it is caused by folic acid deficiency (11). In some populations, 82% of pregnancy are anemic. The most risk are women from low socio-economic people and young women. Anemia is easily definition by estimating the hemoglobin concentration and also examining a peripheral blood smear for the characteristic red blood cell changes (12). The supply of iron is indicated during pregnancy to prevent the possible complications (13).

In this study the prevalence of anemia was 32%, along with our results, El-Moselhy et al., (14) reported the same prevalence in a health care center in Kafr Al-Sheikh, also, Afifi et al., (15) reported that the prevalence of anemia reached 30% in El Sahel Teaching Hospital, Cairo, Egypt. These result was consistent with study done in Jimma University Specialized Hospital, South West Ethiopia, 2006 (38.2%) by Belachew & Legesseand (16) and West Arsi Zone, Ethiopia, 2013 (36.6%) by Obse et al. (17).

In our study there was no significant difference between the two groups regarding maternal age, this result was similar to result obtained by El-Moselhy et al. (14). Also another studies reported same results as Gedefaw et al. (18), Zama et al. (19) and Teshome et al. (20) reported no significant difference between anemic and non-anemic pregnant women. Anemia during pregnancy was more prevalent among housewives with 68.75%. Along with our results El-Moselhy et al. (14) reported high prevalence of anemia in housewives.

Regarding socioeconomic level the percentage of anemic pregnant women was significantly higher in the low socioeconomic standard. Along with our results El-Moselhyet al. (14), reported high significant prevalence of anemia in pregnant women live in low socioeconomic level (73.4%). This finding is in line with Nwizu et al. (21) who found that the risk of anemia was 4.2 times higher among women from the low socioeconomic class as compared with women from the high socioeconomic class.

In our study most anemic pregnant women were multigravida (60.42%). Along with our study Zama et al. (19), reported significant increase in anemia in pregnant multigravida patients. Anemia occurrence was significant with short inter pregnancy interval, same was reported by Zama et al. (19) Also Most anemic patients were in second trimester of pregnancy.

As regard previous miscarriage, our study showed that there was no significant difference between included subjects regarding previous miscarriage occurrence. The present result was in the same line with Bansal et al., (22) and Vindhya et al., (23) as they reported that there was no statistically significant association between previous miscarriage and maternal anemia. This finding was also similar to the result of Ayano & Amentie. (24) and Gebreweld & Tsegaye (25) who observed that history of previous miscarriage did not significantly influence maternal anemia. This may be due to the variation in awareness and food habits of different population and also can be explained by determining certain type of miscarriage (threatened miscarriage) and neglecting the other types during asking the women about history of miscarriage.

This was contrary to Obse et al., (17) who reported that the proportion of maternal anemia was higher among pregnant women who had history of miscarriage and this relationship was statistically significant. In disagreement with the study conducted by Ejeta et al., (26) in which pregnant females with previous miscarriage were more likely to be anemic as compared to their counterpart. This can be explained by miscarriage deplete iron stores of the pregnant women, so women with previous miscarriage are more liable to have IDA.

This study showed a highly significant improvement in Hb% after treatment of anemia with therapeutic iron supplementation. This result is in agreement with a study conducted by Meier et al. (27), on women who developed IDA during the second trimester and received therapeutic supplementation with 180 mg of elemental iron daily and found that the IDA had resolved in 75% of the patients by the end of their pregnancies. Also, El-Moselhy et al. (14) reported a highly significant improvement in Hb% after treatment of anemia with therapeutic iron supplementation: with 200 mg three times daily of ferrous fumarate for 1 month, 49 out of 64 patients had an increase in Hb level (76.5%) ($P < 0.001$).

Conclusion

Although anemia is a common preventable problem, the prevalence of anemia in pregnant women in our study was 32%; there was an obvious improvement in hemoglobin concentration in anemic pregnant women after supplementation of iron by the dose recommended by Egyptian practice guidelines for family physicians.

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