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Determinants and Knowledge of Iron Deficiency Anemia and its Impact among Pregnant Women Attending University Hospital in Mukalla, Yemen

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Abstract: The prevalence of anemia among pregnant women, according to the World Health Organization (WHO), is still higher than 51% in developing countries, and the most common cause is iron deficiency, which has adverse effects on maternal and child health. The purpose of this study is to determine the knowledge and attitude of pregnant women attending University Hospital in Mukalla regarding iron deficiency anemia and its impact. A cross sectional descriptive study was conducted on 320 Yemeni pregnant women from January 1, 2021, to June 30, 2021. Data was collected by a predesigned self-administered questionnaire in the antenatal clinic at the time of the routine antenatal check-up. The results showed that the mean age of participants was 26.8 ± 1.73 years. The prevalence of iron deficiency anemia was high (81%). (23.4%) of the participants know that anemia in pregnancy is present when the hemoglobin concentration is 11 g/dl or less. Most of the participants (72.2%) know that anemia may affect the health of the fetus and cause complications for the mothers. Only (16.6%) of them know that iron tablets are free of cost in primary health care centers and government hospitals. (85.3%) of them know that iron tablets should be taken during pregnancy in spite of a healthy diet. (23.1%) of the participants took iron supplementation irregularly due to drug cost (32.8%). Only (20%) of them get information regarding anemia from health workers. Anemia was statistically lower in pregnant women with regular intake of iron supplements and those taking special diets during pregnancy. The prevalence of anemia in women who attend University Hospital during pregnancy is higher. There is poor knowledge among participants about the preventive measures for iron deficiency anemia. Improving health education about anemia during pregnancy can reduce the prevalence of anemia and improve maternal and fetal outcomes.

Keywords: Determinants; Impact; Iron deficiency anemia; Knowledge; Yemen.

1. Introduction:

Anemia is the most common hematological disorder that occurs during pregnancy and responsible for maternal deaths in developing countries and increased incidence of low birth weight babies and perinatal loss. Over two billion of people suffer from anemia and over 40 million are pregnant women [1]. The incidence of anemia during pregnancy in developed countries is about 14% and is high in developing countries about 51% according to (WHO) [2]. The most common cause of anemia is iron deficiency, accounts for 75%- 95% and is a leading cause of maternal morbidity and mortality [3].

Anemia related to diminished intake of iron during pregnancy that affect the fetal outcome and their neonates as prematurity, low birth weight babies, intrauterine growth restriction and increase perinatal mortality [4]. Iron deficiency anemia account for around 20% of maternal deaths [5]. According to WHO, anemia in pregnancy is identified when hemoglobin concentration in peripheral blood is 11g/dl or less and there are three types according to severity, mild anemia (Hemoglobin concentration 10 -10.9 g/dl), moderate type of anemia (Hemoglobin concentration 7-9.9g/dl) and

severe type of anemia (Hemoglobin concentration less than 7 g/dl) [6].

Iron deficiency anemia is caused by dietary inadequacy or expanded requests during pregnancy [7]. In addition, iron deficiency is a worldwide medical issue occurring in both developing and developed countries with significant effect for human well-being [8]. Anemia is an additional burden on the health system. However, it affects the human being from childhood to adulthood and is more serious during pregnancy [9]. Thus, the fall in the hemoglobin concentration during pregnancy due to effect of hemodilution and physiological changes, the mother and their neonates are at high risk [10].

Regular antenatal care and careful supervision during pregnancy is a main health care program to ensure continued risk assessment. So women benefit from the information, education, promotion and prevention programs, such as advice, reassurance and education about healthy diet during pregnancy, nutritional support, and measures for prevention of anemia during pregnancy [11].

The knowledge about iron supplements and iron intake for pregnant women during pregnancy is essential to prevent iron deficiency during pregnancy and its complication [12]. Health education in pregnancy about iron supplementation can reduce the incidence of anemia and its associated mortality and morbidity [13]. Pregnant women should avoid the tea consumption as it affects the fetal outcome [14]. Nutritional knowledge regarding diet rich iron and supplements is important issue in antenatal check up.

The pregnant women should be educated about healthy nutrition and benefits of iron intake. They should advised to increase the consumption of food that rich with iron, and avoid the foods that interfere with iron absorption as tea and coffee [15].

The attitude about regular antenatal care motivates the pregnant women to consume a healthy diet, iron and folic acid intake, which influence haemoglobin concentration during pregnancy [16].

The aim of study is to determine the knowledge during pregnancy for women attending University Hospital about iron deficiency anemia and its impact on maternal and fetal outcomes during pregnancy.

2. Methodology:

Population:

A cross-sectional descriptive study was conducted at Maternity and Paediatrics University Hospital in Mukalla city (The capital of Hadhramout government, Yemen) in the period between 1st January 2021 to 30th June 2021. The study population consisted of all pregnant women of Yemeni nationality attending Maternity and Paediatrics University Hospital for antenatal care.

Study sample:

We calculated the required sample size by using single population proportion formula $n = \frac{(z)^2 p(1-p)}{day^2}$

The prevalence of anemia in pregnant women, according to a previous study in Yemen (2015), was 32,9 % and took into consideration a 5% margin of error, 95% confidence level. For this study, the calculated sample size should be 339 pregnant women. 339 self-administered questionnaire in Arabic language was distributed to pregnant women who were attending Maternity and Paediatrics University Hospital for antenatal care during study period and who consented to participate in study. 19 questionnaires with incomplete full data were found. So they were not included in this study. The final participants were 320.

Data collection:

Data collection was carried out using a pre-designed self administered structure questionnaire. The questionnaire had details of socio-demographic data, knowledge regarding their awareness of the term anemia, causes of iron deficiency anemia, complications of iron deficiency anemia, attitude and practice on preventing iron deficiency, practice during current pregnancy and source of information about iron deficiency anemia. At the same sitting 1 ml of blood was collected for hemoglobin estimation, analysed and the result was recorded and disclosed to the patient.

Data analysis:

The data was entered into a computer by Statistical Package for Social Sciences (SPSS version 23) and analysed using descriptive statistical tools. P value of <0.05 was considered to be statistically significant. The results were presented in the form of tables and figures using frequencies and percentage to describe the study population in relation to relevant variables

3. Analysis:

Table 1 lists the sociodemographic characteristics of the participants. Of the 320 total participants, around 51.3% were in age range 20-29 years, with a mean age of 26.8 ± 1.73 years. The majority (61.9%) were at school level and (90%) were housewives. Most of participants were multigravida (50.6%) with very low monthly income (between 60 to 120 US dollars) (59.7%). About (74.7%) were at the third trimester of pregnancy.

Figure 1 shows the high prevalence of anemia (81%) during pregnancy. Moderate type was the most common type in our study (41.6%) followed by mild and severe type that account only (5.3%).

Table 1. Socio-demographic data of participants

Variable	Number	Percentage
Age		
<20	41	12.8
20-29	164	51.3
30 and above	115	35.9
Mean Age \pm SD	26.8 \pm 1.73	
Educational level		
Illiterate	75	23.4
School	198	61.9
College	47	14.7
Working status		
Working	32	10
Housewife	288	90
Financial status		
>100000 YR	69	21.6
50000-100000 YR	191	59.7
<50000 YR	60	18.7
Gravidity		
Primigravida	121	37.8
Multigravida	162	50.6
Grand multigravida	37	11.6
Pregnancy trimester		
First trimester	29	9.0
Second trimester	52	16.3
Third trimester	239	74.7

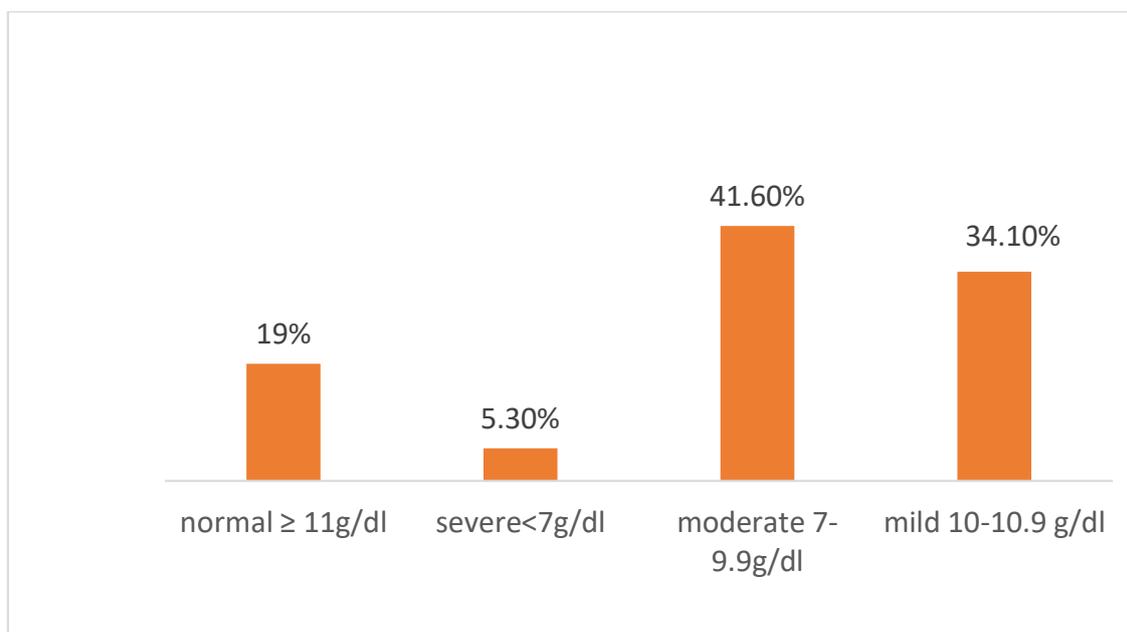
**Figure 1.** Hemoglobin level of the participants in the current pregnancy

Table 2 highlights the knowledge regarding the causes of iron deficiency anemia. The majority of participants know that non-taking iron supplementation during pregnancy (70.3%), not consuming iron rich diet (83.4%), short intervals between

subsequent pregnancies (54.4%), heavy menstrual bleeding before pregnancy (61.9%) were the causes of iron deficiency anemia. Only (30%) were aware that drinking too much tea or coffee might cause iron deficiency anemia.

Table 2. Knowledge regarding causes of iron deficiency anemia

Variable	Yes		No	
	Frequency	%	Frequency	%
Not taking iron supplement during pregnancy	225	70.3	95	29.7
Not consuming iron rich diet	267	83.4	53	16.6
Short intervals between subsequent pregnancies	174	54.4	146	45.6
Heavy menstrual bleeding before pregnancy	198	61.9	122	38.1
Excessive consumption of tea/coffee.	96	30	224	70

Table 3 gives more detailed information about the participants' knowledge on prevention, complications of iron deficiency anaemia. Only (23.4%) knew what anemia was. About three quarters of the participants know that anemia is more prevalent in pregnant woman. The majority of participants know that severe anemia can cause complications

for both the pregnant women and fetuses, about (32.8%) know that consuming iron with food reduces side effects. Only (16.6%) knew that iron tablets are free of cost at Government Hospitals. In the current pregnancy, (50.3%) of the participants were aware of their hemoglobin level.

Table 3. Knowledge of the participants on prevention, complications of iron deficiency anemia

Variable	Yes		No		Don't know	
	Frequency	%	Frequency	%	Frequency	%
Knowledge regarding what is anemia.	75	23.4	110	34.4	135	42.2
Anemia is more prevalent in pregnant women.	243	75.9	22	6.9	55	17.2
Anemia can cause complications to pregnant women.	264	82.5	7	2.2	49	15.3
Growth of the fetus can affected by severe anemia.	238	74.4	21	6.5	61	19.1
To reduce side effects of iron must consuming with food.	105	32.8	31	9.7	184	57.5
In Government Hospitals, the iron tablets are free of cost.	53	16.6	163	50.9	104	32.5
Intake foods rich with vitamin C, fruits and vegetables increase iron absorption	149	46.5	29	9.1	142	44.4
Awareness of hemoglobin level during pregnancy	161	50.3	159	49.7	0	0

As shown in table 4, most participants agree about the importance of antenatal check-up, eating healthy and special diet during pregnancy, taking iron supplementation is beneficial for mother and baby, and promotion family planning to prevent iron deficiency anemia.

Table 4. Participant's knowledge and practice about prevention of iron deficiency anemia

Variable	Agree		Disagree		Neither	
	Frequency	%	Frequency	%	Frequency	%
Regular antenatal check-up	282	88.1	9	2.8	29	9.1
Taking special diet in pregnancy	250	78.1	36	11.3	34	10.6
Iron tablets are beneficial for mother and baby	269	84.1	9	2.8	42	13.1
Iron tablets should be taken in spite healthy diet	273	85.3	19	5.9	28	8.8
Using family planning methods for spacing prevent anemia	187	58.4	31	9.7	102	31.9

Poor practice about the type of food was seen among participants, (72.8%) of them take usual diet rather than special diet in the current pregnancy. (40.3%) taken iron supplementation regularly. The most common reasons behind irregular iron intake during current pregnancy in the participants was the cost (32.8%) as seen in table 5.

Table 6 shows the main source of educational information regarding anemia was from mass media (32.8%) and only (20%) from health facility workers.

Table 5. Practice during the current pregnancy

Variable	Frequency(n)	Percent (%)
Food after getting pregnancy		
You take usual diet	233	72.8
You take special diet	87	27.2
Iron tablets intake during current pregnancy		
Regular	129	40.3
Irregular	74	23.1
Not taking	117	36.6
Reasons of irregular iron intake		
Difficult to remembering take pill	92	28.8
Afraid from side effects	88	27.5
You think not necessary	20	6.3
Cost	105	32.8
Not advised by health professional	15	4.6

Table 6. Source of information about iron deficiency anemia among the participants

Variable	Frequency(n)	Percent (%)
TV	40	12.5
Radio	15	4.7
friends	25	7.8
Mass media	105	32.8
Family	71	22.2
Health facility workers	64	20

4. Discussion

Anemia during pregnancy is a worldwide public health issue that affect both developing and developed countries and associated with maternal and fetal morbidity and mortality. The prevalence of anemia during current study in Mukalla city was high 81%, which was higher than the WHO cut-off in developing countries. Also this result was found to be higher than that study done in other Arabic cities as in Mekaa, Saudia Arabia 39% [17], Khamis Mushayt, Saudi Arabia 42.5% [18], Oman 41.7% [19]. From other studies conducted in Nepal [16], Ethiopia [20], Uganda [21], the prevalence was found to be 49%, 32% and 7.4% respectively. The pregnant women in Mukalla has high prevalence of anemia which was not surprising as Yemen economy has been severely affected by the conflict, the national currency (Yemeni Rial) continues its depreciation against US Dollar, and consequently raising food and fuel prices, also prolonged unresolved war exhausted the country leaving people with little resource, low to very low income.

The age of most participants, 51.3% in the current study were mainly within 20 - 29 years that was consistent with study done by Abdelhefez et al [17] and Ademuyiwa et al [22]. 57% of the participants were at the school level, lower than one study done by Nelofar et al [12], which was 63.5 %. While illiteracy was 26.2% where it was lower than the same study done by Nelofar et al [12], 38% were illiterate, this may be because the study populations had different educational levels as in the previous study, none of the participants were at college level.

The majority of participants in our study were housewives 81.3% which was somewhat similar to that reported by the Nelofar et al [23] which was 85.5%. Only 23.4% of participants were knew about anemia in pregnancy which was still higher than one study in Ethiopia reported by Oumer et al [24] were 11.7 % of pregnant mothers have ever heard about anemia, this difference could be related to geographic and study population involved in two studies. In the current study 48% of the participants were knew the correct definition of anemia. In addition, 75.9% knew that anemia is more prevalent during pregnancy. During the current pregnancy 49.7% of women aware about their Hemoglobin concentration.

The general attitude towards antenatal care, promotion of family planning and iron intake during pregnancy were generally well which was consistent with other study done by Noronha et al [5] and Serbesa et al [20], while poor attitude was seen by Nelofar et al [23], this may be related to a difference in socioeconomic and educational level between the study populations. Only 16.6% of participants know that Iron tablets are free of cost at Government Hospitals which was low, indicate inadequate health education by health facility workers in antenatal care centers, compared with one study done by Habib et al [25] were 100% of participants didn't receive iron supplements from government hospital.

According to WHO classification for degree of anemia during pregnancy, severe anemia was seen in 5.3% in our study, similar to that reported by Enas et al [18] in Saudi Arabia 3.8%. 72.8% only consumed their regular diet during pregnancy in our study, which is higher than the study done

by Habib et al [25], which were 3.1% this might be due to differences in the economic status of the two countries.

Only 40.3% of the participants in the current study were taken iron regularly which was lower than that reported by Nelofar et al [23] 53% and also lower than results found in a study done by Serbesa et al [20] which was 62.9%, this discrepancy may be due to insufficient health education and low income. The main source of educational information regarding anemia was the mass media which was 32.8% while 20% get information from health workers and 20.1% from family compared with that reported by Enas et al [18] were 50% of the women revealed that the family was the main source of information and 16% received their information from a health professionals.

Regarding determinants in this study low educational level, low socioeconomic status and pregnancy in third trimester were significantly related to anemia (p-value <0.05) which consistent with the study done in Makkah by Abdelhefez et al [17].

5. Conclusion

In Mukalla, the prevalence of anaemia during pregnancy was high. Despite the fact that pregnant women have a good knowledge about the causes of anemia and how to prevent, most women have a positive attitude toward iron deficiency anemia prevention methods, family planning is implemented, and pregnant mothers are given iron supplements, but still the majority of pregnant women don't take special diet in pregnancy or take iron supplement regularly due to low socioeconomic condition.

Recommendation:

1. Improving and personalization health education about anaemia during pregnancy, along with a mass media for awareness purposes in the region.
2. Preparations of brochure, which describes symptoms, risk factors and ways of preventions and increase the positive perception as well as pregnant women's attitudes and behaviors toward the prevention of iron deficiency anemia in pregnancy.
3. Prescribing iron tablets free of cost from government hospitals and primary health care centers for all pregnant women.

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المحددات المعروفة بفقر الدم الناجم عن نقص الحديد وأثره في الحوامل اللواتي يترددن على المستشفى الجامعي في المكلا، اليمن

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الملخص: وفقاً لمنظمة الصحة العالمية، لا يزال انتشار فقر الدم بين النساء الحوامل مرتفعاً حيث يصل إلى 51% في البلدان النامية ونقص الحديد السبب الأكثر شيوعاً وله آثار ضارة على صحة الأم والطفل. تستهدف هذه الدراسة تقويم معرفة وممارسات النساء الحوامل المترددات على المستشفى الجامعي بمدينة المكلا فيما يتعلق بفقر الدم الناجم عن نقص الحديد وأثره. أجريت دراسة وصفية مقطعية في المدة ما بين 1 يناير 2021 إلى 30 يونيو 2021. تم جمع البيانات عن طريق المقابلة باستخدام استبيان مصمم مسبقاً. بلغ العدد الإجمالي للمشاركات 320 امرأة يمنية حاملاً. وأظهرت النتائج أن انتشار فقر الدم كان مرتفعاً (81%). (23.4%) من المشاركات يعرفن أن فقر الدم في أثناء الحمل يعني أن مستوى الهيموجلوبين أقل من 11 جم / ديسيلتر. تعرف معظم المشاركات (72.2%) أن فقر الدم قد يؤثر في صحة الجنين ويسبب أيضاً مضاعفات للأم. فقط (16.6%) منهن يعرفن أن أقرص الحديد تقدم مجاناً في المستشفيات الحكومية. (85.3%) منهن يوافقن على ضرورة تناول النساء الحوامل لمكملات الحديد بالرغم من اتباع نظام غذائي صحي. (23.1%) من المشاركات يتناولن مكملات الحديد بشكل غير منتظم بسبب تكلفة الدواء (32.8%). فقط (20%) منهن يحصلن على معلومات بخصوص فقر الدم من العاملين الصحيين. كان فقر الدم منخفضاً إحصائياً لدى أولئك اللاتي يتناولن مكملات الحديد بانتظام واللواتي يتناولن نظاماً غذائياً خاصاً مع الحمل. انتشار فقر الدم بين النساء الحوامل اللواتي يترددن على عيادة متابعة الحمل في المستشفى الجامعي كانت مرتفعة. كما أن هناك ممارسات سيئة للحوامل فيما يتعلق بالوقاية من فقر الدم الناجم عن نقص الحديد. سيساعد تحسين التثقيف الصحي حول فقر الدم في أثناء الحمل من تقليل نسبة انتشار فقر الدم وتحسين نتائج الأم والجنين.

الكلمات المفتاحية: المحددات، الأثر، فقر الدم الناجم عن نقص الحديد، المعروفة، اليمن.