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Original article

Study of Iron Deficiency Levels among Pregnant Women Attending the Obstetrics Golden Complex Clinic, Sirte

Munay Deekari[1]*, Hana Zaed[2]

[1]*Department of Obstetrics and Gynecology, Faculty of Medicine, University of Sirt, Sirt, Libya*
[2]*Department of Medical Laboratory Sciences, Faculty of Health Science, University of Sirt, Sirt, Libya*
Correspondence email. *monadikary@gmail.com*

Abstract
Iron deficiency anemia (IDA) is a major public health concern among pregnant women, associated with adverse maternal and fetal outcomes. During pregnancy, iron requirements increase substantially, and failure to meet these demands can result in anemia, fatigue, and impaired immune function. This study was conducted to assess the prevalence of iron deficiency among pregnant women in Sirte city, Libya, and to examine its association with age, abortion history, menstrual cycle length, and parasite infection status. A cross-sectional study was conducted between July and August 2024 involving 120 pregnant women attending Golden Complex Clinic and Al-Ghad Clinic. Serum iron levels were measured using the Mindray CL-1200i analyzer and categorized as <12 ng/ml, 12–15 ng/ml, and >15 ng/ml. Data were analyzed using SPSS version 25, with descriptive statistics and Chi-square tests applied; $p<0.05$ was considered significant. Overall, 80.8% of participants had iron levels <12 ng/ml, 18.3% were between 12–15 ng/ml, and only 0.8% exceeded 15 ng/ml. The highest prevalence of deficiency was observed in the 20–25-year age group (32.5%). Women with a history of abortion showed 25% deficiency compared to 55.8% among non-abortion cases. Iron deficiency was also prevalent among women with shorter menstrual cycles (49.1% in 5-day cycles vs. 31.6% in 6–11-day cycles) and among those with parasite infections (26.6%). The study revealed a high prevalence of iron deficiency among pregnant women in Sirte city, with significant associations across age, reproductive history, menstrual cycle, and infection status. These findings underscore the urgent need for nutritional interventions, health education, and integrated strategies to address iron deficiency and improve maternal health outcomes.
Keywords. Iron Deficiency, Pregnant Women, Golden Complex Clinic.

Introduction

Iron is a vital component of hemoglobin, the protein responsible for transporting oxygen in the blood. Adequate iron levels are essential for optimal cellular function, as insufficient iron concentrations hinder the blood's ability to carry oxygen effectively, ultimately affecting the normal functioning of every cell in the body. During pregnancy, the demand for iron increases significantly due to the expansion of maternal blood volume and the needs of the developing fetus. It is estimated that a total of 840-1210 mg of iron must be absorbed throughout pregnancy, with the greatest demand occurring during the second half [1]. When the iron requirements of pregnancy are not met, maternal hemoglobin levels can fall below 11 g/dL, with levels under 10 g/dL (hematocrit below 33%) indicating a suspicion of iron deficiency. Iron deficiency anemia (IDA) is a major public health issue, particularly among pregnant women, and is one of the most common nutritional deficiencies globally. Iron deficiency anemia is associated with adverse health outcomes for both the mother and fetus, including fatigue, weakness, and impaired immune function [2].

The prevalence of iron deficiency and IDA varies across different populations, with pregnant women being particularly vulnerable due to physiological changes and increased iron requirements. Factors such as inadequate dietary intake, poor absorption, and increased iron losses contribute to low iron levels during pregnancy [3]. Additionally, socioeconomic status, education, and access to healthcare services significantly influence the nutritional status of pregnant women [4]. Women with a history of poor dietary intake, frequent pregnancies, or previous iron depletion are at heightened risk. Moreover, iron absorption from plant-based diets is low (~5%) due to factors that inhibit uptake, such as phytates and polyphenols, whereas absorption is higher (~15%) from diets rich in meat and fish (which are more prevalent in developed countries). Therefore, studying iron deficiency levels among pregnant women is crucial for identifying at-risk populations and implementing effective interventions [5].

Methods

A total of 120 pregnant women participated in the study, which involved measuring serum iron levels. Participants were categorized based on their abortion history, menstrual cycle length (5 days vs. 6-11 days), and parasite infection status (infected vs. non-infected). Iron levels were classified into three categories: below 12 ng/ml, between 12-15 ng/ml, and above 15 ng/ml. Statistical analysis was conducted to identify significant differences between groups. Blood samples were collected from pregnant women attending the Golden Complex Clinic and the Al-Ghad Clinic residential. The study started in July 2024 and ended in August 2024. The study targeted 120 random cases of pregnant women. 2.5 ml of blood was drawn from

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each case and placed in a chemistry tube (Red tube) for the analysis of iron deficiency. The analyses were conducted using a Mindray CL-1200i device to estimate the iron level.
Data analysis was performed using SPSS software version 25. Descriptive statistics, including the number and percentage mean, were calculated for all variables. Proportions were compared using Chi-square tests, and a P-value less than 0.05 was considered statistically significant.

Results

The prevalence of anemia is an important health indicator when it is used with other measurements of iron status; hemoglobin concentration can provide information about the severity of iron deficiency. The physical, clinical, and laboratory measurements have been taken directly. The data were collected according to the specified criteria of eligibility.

Table 1. The prevalence of iron deficiency in pregnant women by age group

	Iron rate	<12ng/ml	12-15ng/ml	>15ng/ml	Total
Age	20-25y	39(32.5%)	4(3.3%)	0(0%)	43(35.8%)
	26-31y	31(25.8%)	8(6.6%)	0(0%)	39(32.5%)
	32-37y	17(14.1%)	6(5%)	1(0.38%)	24(20%)
	38-43y	8(6.6%)	3(2.25%)	0(0%)	11(9.16%)
	44-49y	2(1.66%)	1(0.38%)	0(0%)	3(2.5%)
Total		97(80.8%)	22(18.3%)	1(0.83%)	120(100%)

Prevalence of iron deficiency in pregnant women according to age group

As is shown in (Table 1). This study was conducted on 120 pregnant women who visited Golden Complex Clinic and the Al-Ghad Clinic in Sirte city, for an age group between (20-49).
The assessment of iron deficiency among pregnant women attending the obstetrics clinic revealed a significant prevalence across all age groups. In the 20–25-year age group, 32.5% had iron levels below 12 ng/ml, and 3.3% were between 12-15 ng/ml. The 26–31-year group showed 25.8% with deficiency, while 6.6% fell within the 12-15 ng/ml range. In the 32–37-year group, 14.1% had levels under 12 ng/ml, with 5% between 12-15 ng/ml and 0.38% above 15 ng/ml. For the 38–43-year group,6.6 % were deficient, and 2.25% had levels between 12-15 ng/ml. In the 44–49-year group,1.66% exhibited deficiency, with 0.38% in the 12-15 ng/ml range. Overall, 80.8% of the 120 women studied were found to have iron deficiency, emphasizing the urgent need for nutritional interventions and health education to address this issue (Table 1, Figure 1).

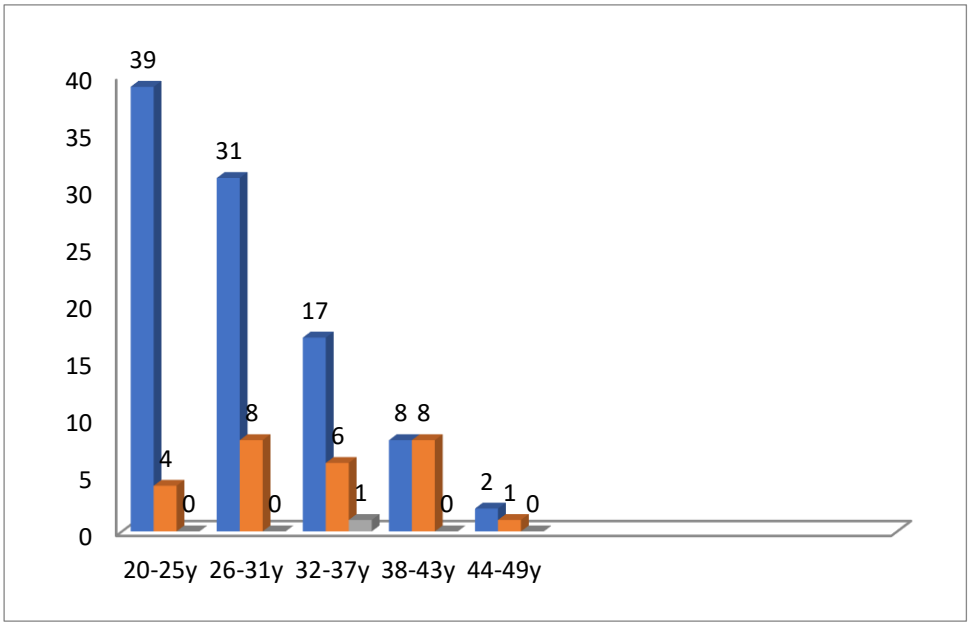

Figure 1. The prevalence of iron deficiency in pregnant women by age group

Table 2. The prevalence of iron deficiency in pregnant women according to abortion status

Iron rate	<12ng/ml	12-15ng/ml	>15ng/ml	Total
Abortion	30(25%)	4(3.3%)	1(2.8%)	35(29.1%)
Non- abortion	67(55.8%)	18(15%)	0(0.0%)	85(70.8%)
Total	97(80.8%)	22(18.3%)	1(0.8%)	120

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The prevalence of iron deficiency in pregnant women according to abortion status

The assessment of iron deficiency among pregnant women in relation to their abortion status revealed significant findings. Among women who had experienced an abortion, 25% had iron levels below 12 ng/ml, while 3.3% were between 12-15 ng/ml, and only 2.8% exceeded 15 ng/ml. In contrast, among non-abortion women, 55.8% had levels below 12 ng/ml, 15% were in the 12-15 ng/ml range, and none had levels above 15 ng/ml. Overall, from a total of 120 women studied, 97 (80.8%) were found to have iron levels below 12 ng/ml, 22 (18.3%) were between 12-15 ng/ml, and 1 (0.8%) had levels above 15 ng/ml. These results underscore the critical need for targeted nutritional interventions and health education to address iron deficiency, particularly among women with a history of abortion (Table 2)

Table 3. The prevalence of iron deficiency in pregnant women according to the menstrual cycle

Iron		**<12ng/ml**	**12-15ng/ml**	**>15ng/ml**	**Total**
Menstrual cycle	5day	59(49.1%)	12(10%)	1(0.38%)	72(%)
	6-11day	38(31.6%)	10(8.3%)	0(0.0%)	48(%)
Total		97(80.8%)	22(18.3%)	1(0.83%)	120

The prevalence of iron deficiency in pregnant women according to the menstrual cycle

The assessment of iron deficiency among pregnant women based on their menstrual cycle revealed notable differences in iron levels. Among women with a menstrual cycle of 5 days, 49.1% had iron levels below 12 ng/ml, while 10% were between 12-15 ng/ml, and 0.38% exceeded 15 ng/ml. In contrast, women with a cycle of 6-11 days showed that 31.6% had levels below 12 ng/ml, with 8.3% in the 12-15 ng/ml range, and none had levels above 15 ng/ml. Overall, from the total of 120 women studied, 97 (80.8%) had iron levels below 12 ng/ml, 22 (18.3%) were between 12-15 ng/ml, and 1 (0.83%) had levels exceeding 15 ng/ml. These findings highlight the critical need for targeted nutritional interventions and health education to address iron deficiency, particularly in relation to menstrual cycle variations (Table 3, Figure 3).

Table 4. The prevalence of iron deficiency in pregnant women according to parasite infection

Infection	**Iron**	**<12ng/ml**	**12-15ng/ml**	**>15ng/ml**	**Total**
	Infected	32(26.6%)	8(6.6%)	0(0.0%)	40 (33.3%
	Non-Infected	65(54.1%)	14(11.6)	1(0.83%)	80 (66.6%)
Total		97(80.8%)	22(18.3%)	1(0.83%)	120

The prevalence of iron deficiency in pregnant women according to parasite infection

The analysis of iron deficiency among pregnant women based on parasite infection status revealed significant findings. Among the infected group, 26.6% had iron levels below 12 ng/ml, while 8% were in the 12-15 ng/ml range, with none exceeding 15 ng/ml. In contrast, among the non-infected women, 54.1% had iron levels below 12 ng/ml, 11.6 % were in the 12-15 ng/ml range, and 0.83% had levels above 15 ng/ml. Overall, from the total of 120 women studied, 97 (80.8%) had iron levels below 12 ng/ml, 22 (18.3%) were between 12-15 ng/ml, and 1 (0.8%) had levels exceeding 15 ng/ml. These results highlight the critical need for targeted health interventions and monitoring of iron deficiency, particularly in relation to parasite infections among pregnant women (Table 4).

Discussion

The assessment of iron deficiency among pregnant women in this study revealed a high prevalence across all age groups, with 80.8% of the 120 women affected. This aligns with findings from similar studies that also highlight significant rates of iron deficiency in pregnant populations. For instance, a study conducted by [6]. reported that approximately 80% of pregnant women in Italy experienced iron deficiency anemia, indicating a considerable public health concern. Similarly,[7]. noted that global prevalence rates of anemia, particularly due to iron deficiency, range from 30% to 40% among pregnant women in various regions, underscoring the widespread nature of this issue.

In our study, the age group of 20-25 years showed the highest deficiency at 35.8%, while the 26–31-year group had 32.5%. This trend mirrors findings from [8], which indicated that younger pregnant women are at a higher risk of developing iron deficiency due to increased nutritional demands and dietary inadequacies. The results from the 32-37- and 38-43-year age groups (0.38% and 6.6% deficient, respectively) further support the findings of [3]. who emphasized that iron deficiency remains prevalent among women of reproductive age, particularly those who are pregnant or postpartum? In contrast, the 44–49-year age group in our study exhibited a slightly lower deficiency rate at 1.66%, which may reflect the fact that women in this age group may have completed their childbearing years and could potentially have more stabilized iron levels compared to younger cohorts. Overall, these comparisons highlight the consistency of our findings with existing literature, reinforcing the urgent need for nutritional interventions and health education to combat iron deficiency in pregnant women.

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The assessment of iron deficiency among pregnant women based on abortion status revealed significant insights, with 25% of women who had experienced an abortion showing iron levels below 12 ng/ml. In contrast, 55.8% of non-abortion women had similar deficiency levels. These findings align with previous studies that highlight the impact of reproductive history on iron status. For instance, a study by [9]. indicated that women with a history of abortion or miscarriage are at a higher risk for iron deficiency due to potential blood loss and increased nutritional demands during subsequent pregnancies. Similarly, [10] found that women who had experienced pregnancy complications, including abortion, were more likely to present with lower iron levels compared to those without such a history.

The assessment of iron deficiency among pregnant women according to menstrual cycle revealed that 49.1% of those with a 5-day cycle had iron levels below 12 ng/ml, while 31.6% of women with a 6-11 day cycle showed similar deficiency. These findings are consistent with existing literature that emphasizes the relationship between menstrual patterns and iron status. For example, a study by [11] indicated that women with heavier menstrual bleeding often experience increased iron loss, leading to higher rates of iron deficiency anemia. This is particularly relevant for those with shorter cycles, as they may not have sufficient time to replenish iron stores.

The assessment of iron deficiency among pregnant women based on parasite infection status showed that 26.6% of infected women had iron levels below 12 ng/ml, compared to 54.1% among non-infected women. These findings underscore the significant impact of parasitic infections on iron status, although the prevalence of deficiency was similarly high in both groups. Previous research supports these observations. For instance, a study by [12]**.** found that parasitic infections, especially malaria and intestinal worms, can exacerbate iron deficiency anemia due to increased blood loss and decreased iron absorption. Furthermore, [13]**.** noted that iron deficiency is prevalent among pregnant women in regions with high rates of parasitic infections, emphasizing the need for integrated health strategies that address both iron supplementation and parasite control. Additionally, research by [14] indicated that even in populations without overt parasitic infections, subclinical infections can still lead to significant iron depletion, impacting overall maternal health. This aligns with our study's findings, suggesting that both infected and non-infected pregnant women remain at risk for iron deficiency. Overall, these comparisons highlight the necessity for comprehensive health interventions that address both iron deficiency and parasitic infections to improve maternal and fetal health outcomes.

Conclusion

The study on iron deficiency among pregnant women revealed a significant prevalence of deficiency across various factors, including abortion history, menstrual cycle, and parasite infection status. The findings indicated that a substantial percentage of women had iron levels below the critical threshold of 12 ng/ml, highlighting the urgent need for nutritional interventions. Notably, women with a history of abortion exhibited particularly high rates of deficiency, as did those with different menstrual cycle lengths and parasite infections. These results underscore the complex interplay between reproductive health and iron status, necessitating a multifaceted approach to address this public health issue.

Conflict of interest. Nil

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