Assessing the Prevalence and Consequences of Anemia among Pregnant Women in Pakistan

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Abstract

Anemia during the pregnancy affects nearly half of pregnant women worldwide. A study in Multan, Pakistan, involving 385 women, explored this issue using a cross-sectional design. Researchers collected data on socio-demographics, obstetric history, prenatal care, and clinical symptoms. Blood tests revealed that 77% of the participants suffered from iron deficiency anemia (IDA).The study identified the key risk factors for IDA, including high gravidity, short intervals between births, poor diet, and low socioeconomic status. These factors contribute significantly to the prevalence of anemia among pregnant women in this region. Furthermore, the study found a strong association between anemia and adverse pregnancy outcomes, such as higher rates of preterm delivery and intrauterine growth restriction (IUGR). These findings underscore the critical need for effective interventions to address this health issue. Iron supplementation and improved antenatal care are essential strategies to enhance maternal and fetal health. The study emphasizes that addressing nutritional deficiencies and improving healthcare access for pregnant women, particularly those from lower socioeconomic backgrounds, can significantly reduce the incidence of anemia and its associated complications. In conclusion, this study highlights that higher gravidity and shorter birth intervals increase anemia risk, which is linked to higher rates of preterm delivery and intrauterine growth restriction (IUGR). Targeted interventions like iron supplementation and improved antenatal care are essential to improve maternal and fetal health outcomes the widespread issue of anemia during pregnancy in Multan, Pakistan and the urgent need for targeted measures to improve maternal and fetal health outcomes through better nutrition and healthcare services.

Keywords

Anemia, pregnancy, Iron Deficiency Anemia (IDA), preterm delivery, Intrauterine Growth Restriction (IUGR), hematological changes.

Introduction

Anemia during pregnancy is a. significant Global health concern with one-third of the global population anguish from anemia, also 50% of cases occurring throughout pregnancy [1]. Certain women develop anemia slowly, while some females experience it from conception [2]. Maternal anemia poses various risks, including increased miscarriage rates, intrauterine growth restriction (low birth weight), prematurity, fetal death, and anemia in newborns [3]. This is due to the crucial role of iron in many cellular functions and the primary growth of the nervous system, making it essential for both intrauterine as well as postnatal development [4]. The last trimester is critical for fetal weight gain and iron storage. Post-birth, high growth rates in full-term infants rely on iron reserves accumulated during pregnancy, which are utilized in the starting 4-6 months of life [5]. Delivery weight remains a vital survival determinant, with low birth weight infants facing higher risks of illness and mortality in their first year [6,7]. Prenatal females with severe iron insufficiency or Iron Deficiency Anemia (IDA) might experience shortness of inhalation, weakness, pallor, fatigue as well as tachycardia [8]. The average iron requirement during pregnancy is 1000 mg. Significant hematological changes, including increased Red Blood Cell (RBC) mass and blood volume throughout the third trimester, raise the risk of IDA, potentially leading to complications and increased morbidity and mortality for both mother and child. Poor nutritional intake, lack of awareness, and insufficient dairy product consumption are key risk factors for IDA, highlighting the need for awareness on proper dietary intake and antenatal care [9]. The World Health Organization (WHO), expresses anemia such as a hemoglobin level of less than 11 g/dl [10]. Iron deficiency anemia (IDA) is caused by factors such as malnutrition, parasites, chronic illnesses, malaria, and deficiencies in folic acid, vitamin B12, and iron [11,12]. In developing countries, anemia affects more than two-thirds of prenatal females, with iron insufficiency being the primary cause in 95% of cases [13]. The iron stores at conception and the amount absorbed during pregnancy are crucial in preventing IDA [14]. Given the common occurrence of anemia during pregnancy in these regions, indicating insufficient preexisting iron stores and the inability of physiological changes during pregnancy to meet increased needs, iron supplementation has become a routine preventive measure [15].

Material and Methods

Experimental Design

This study combined the observational analytical cross-sectional methodologies with convenience sampling techniques. It was conducted in various healthcare settings including the Nishtar Hospital Gynecology center Multan Pakistan, Government Fatima Jinnah hospitals in Multan Pakistan and the Department of Gynecology in Civil hospital Multan Pakistan. Ethical approvals were obtained from respective institutional review boards, following the Declaration of Pakistan association and other relevant guidelines.

Study Cohort

An entire of 385 prenatal females contributed in the study across three locations:

- 55 women from Nishtar Hospital Gynecology center, aged 20-38 years.
- 285 women from Government Fatima Jinnah hospitals spanning the 1st and 2nd trimesters.
- 45 women in their second trimester with diagnosed iron deficiency anemia at Civil hospital.

Participants were selected based on criteria such as the presence of prenatal care documentation, singleton pregnancies, and no congenital malformations in fetuses. There are some **contemporary parameters** that measured in the pregnant ladies such as: Age, Education, Menarche, Gynecological age, Gestational age, Pregnancies, Supplementation, Pre-gestational weight, gestational, prenatal consultations, Pre-gestational BMI, Current BMI. **Exclusion criteria** included smoking, drug use, infectious diseases, serious pregnancy comorbidities, and receipt of blood transfusions.

Data Collection

Data was collected through medical records, self-administered questionnaires, and interviews. The parameters collected included socio-demographic data, obstetric history, prenatal care details, dietary practices, economic status, and clinical symptoms.

Maternity and Prenatal Health Evaluation:

Information included chronological and gynecological age, schooling, medication or nutritional supplement usage, gestational age by the last menstrual period and ultrasound numeral of pregnancies, intervals between pregnancies as well as deliveries, numeral of prenatal visits, reproductive history as well as recent obstetric diseases.

Nutritional Assessment: Pre-gestational anthropometric status was assessed using pre-pregnancy weight and Body Mass Index (BMI) classifications according to WHO guidelines.

Blood Collection and Analyses: Blood samples were collected from pregnant women before delivery and from umbilical cord blood at delivery. Analyses included Hematocrit, Haemoglobin, Red Cell Distribution Width (RDW), Iron & Ferritin Test as well as Transferrin Saturation Index (TSAT).

Treatments

Participants in Nishtar Hospital Gynecology center were divided into two groups:

Control Group: Received dietary advice and polysaccharide iron complex capsules (500 mg daily).

Study Group: Received the same treatment as the control group plus 0.1 g of oral vitamin C daily. The treatment duration was 4 weeks.

Clinical analysis

- **Hematological analyses** were performed using an automatic device (BC 2800).
- **Biochemical analyses** including serum ferritin, serum iron, hepcidin, and transferrin saturation, were performed using Enzyme-Linked Immuno Sorbent Assays (**ELISA**) and automatic equipment (BS 220).

Clinical efficacy was determined based on RBC count, Hb levels, and symptom improvement.

Results

Table 1: Age distribution of participants

Age	Frequency	Percentage
18-24 years	55	14.2%
25-38 years	285	74%
39-46 years	45	11.8%
Total	**385**	**100%**

Table 2. Risk factors of the iron deficiency anemia and its severity

Variable	Conditions	Normal (12-16mg/dl)	Mild (10-10.9mg/dl)	Moderate (7.9-9mg/dl)	Severe (<7mg/dl)
Menarche severity		80	85	106	44
Less sever		16	17	23	14
Trimester	1st	62	67	67	27
	2nd	34	35	65	31
Gravidity	<3	66	75	85	32
	3-5	27	25	37	15
	>6	3	2	7	11
Family planning	Yes	50	44	66	26
	No	46	58	63	32
DDS	High	47	31	30	12
	Medium	22	27	40	22
	Low	27	44	59	24
Animal source food	Yes	40	48	60	17
	No	56	54	69	41

Table 3. Adequacy of gestational wright gain according to pre-gestational BMI

Pre-gestational BMI	Insufficient	Adequate	Excessive
Underweight	20.0%	40.0%	40.0%
Eutrophia	39.1%	26.1%	34.8%
Overweight	33.3%	20.0%	46.7%
Obesity	36.4%	0%	63.6%

Table 4. Distribution of menstrual cycle length

Menstrual Cycle Length	Frequency (%)
less than 21 days	11.6%
Between 21 to 35 days	61.2%
More than 35 but less than 90 days	4.4%
Irregular menstrual pattern	22.8%
Total	100%

Table 5. Distribution Infectious diseases in last Year

Infectious diseases in last Year	Frequency (%)
Malaria	18%
Typhoid	39%
Renal Diseases	13%
Hepatitis	21%
Others	9%
Total	100%

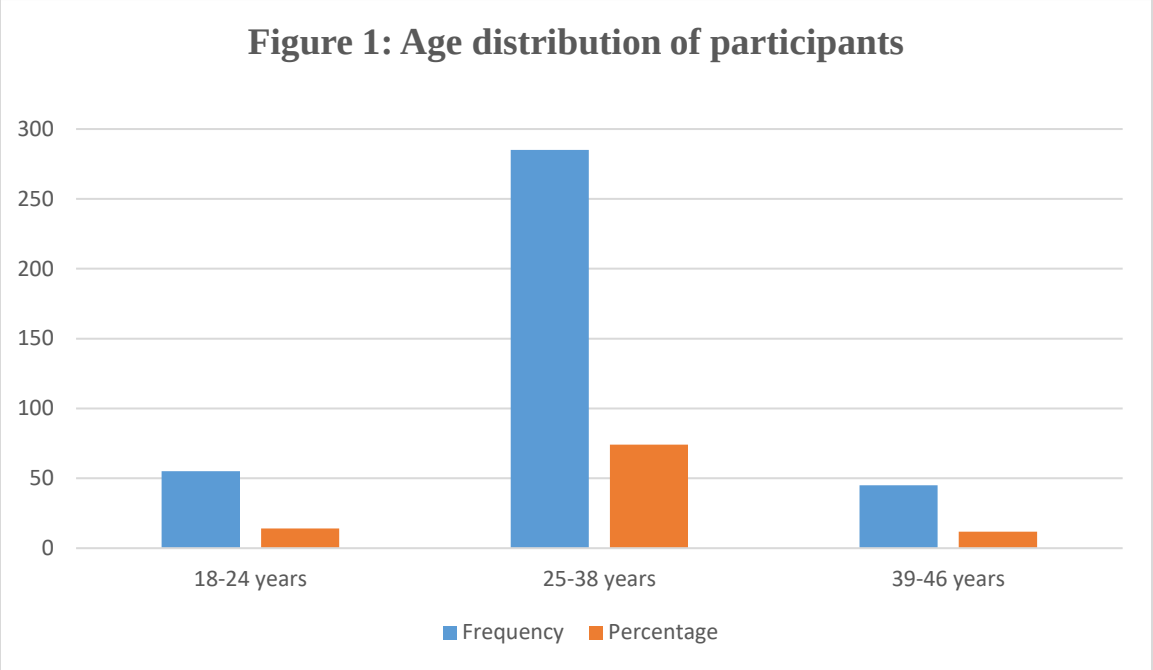


Figure 1: Age distribution of participants
300
250
200
150
100
50
0
18-24 years
25-38 years
39-46 years
Frequency
Percentage

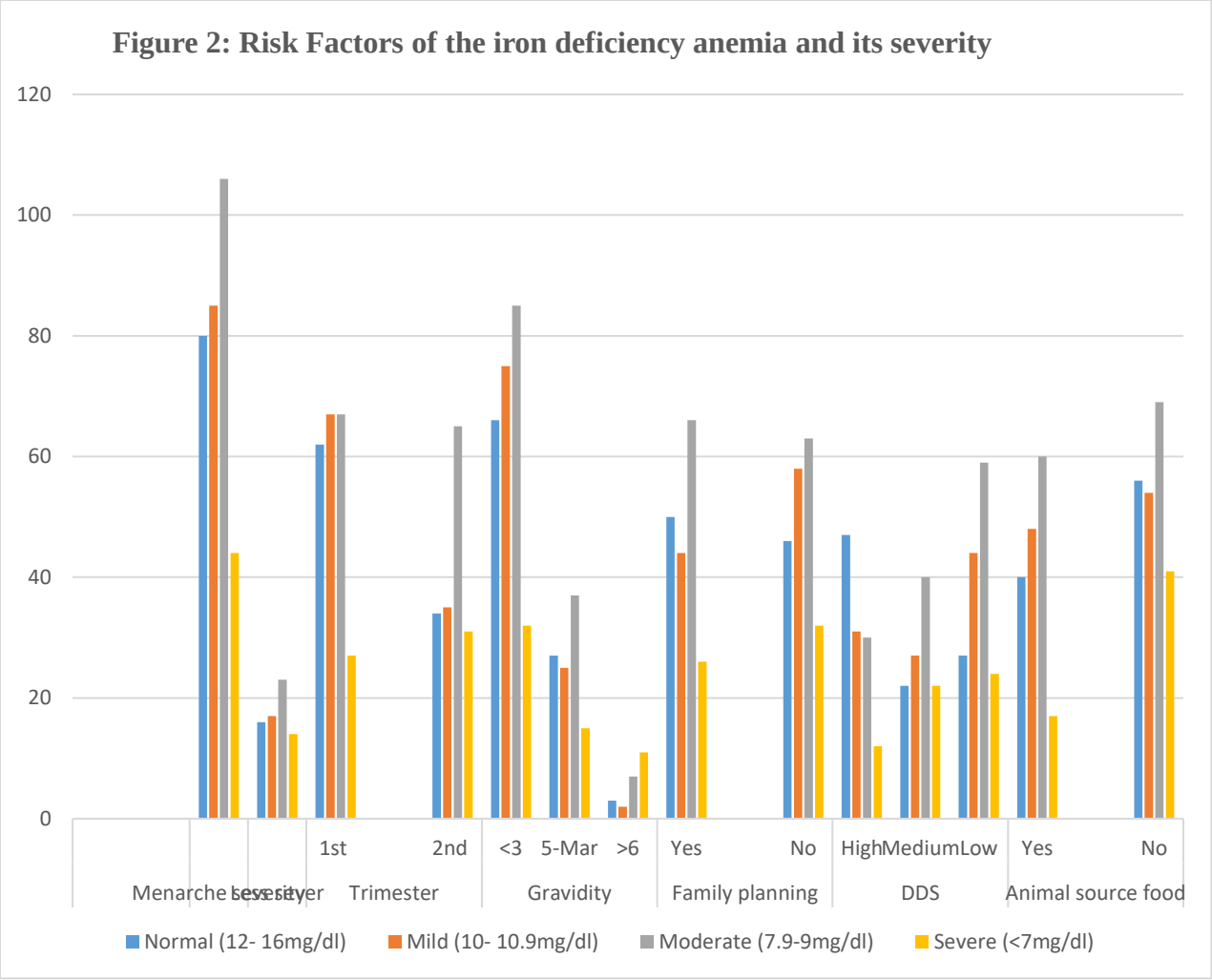


Figure 2: Risk Factors of the iron deficiency anemia and its severity
120
100
80
60
40
20
0
1st
2nd
<3
5-Mar
>6
Yes
No
High
Medium
Low
Yes
No
Menarche
Trimester
Gravidity
Family planning
DDS
Animal source food
Normal (12- 16mg/dl)
Mild (10- 10.9mg/dl)
Moderate (7.9-9mg/dl)
Severe (<7mg/dl)

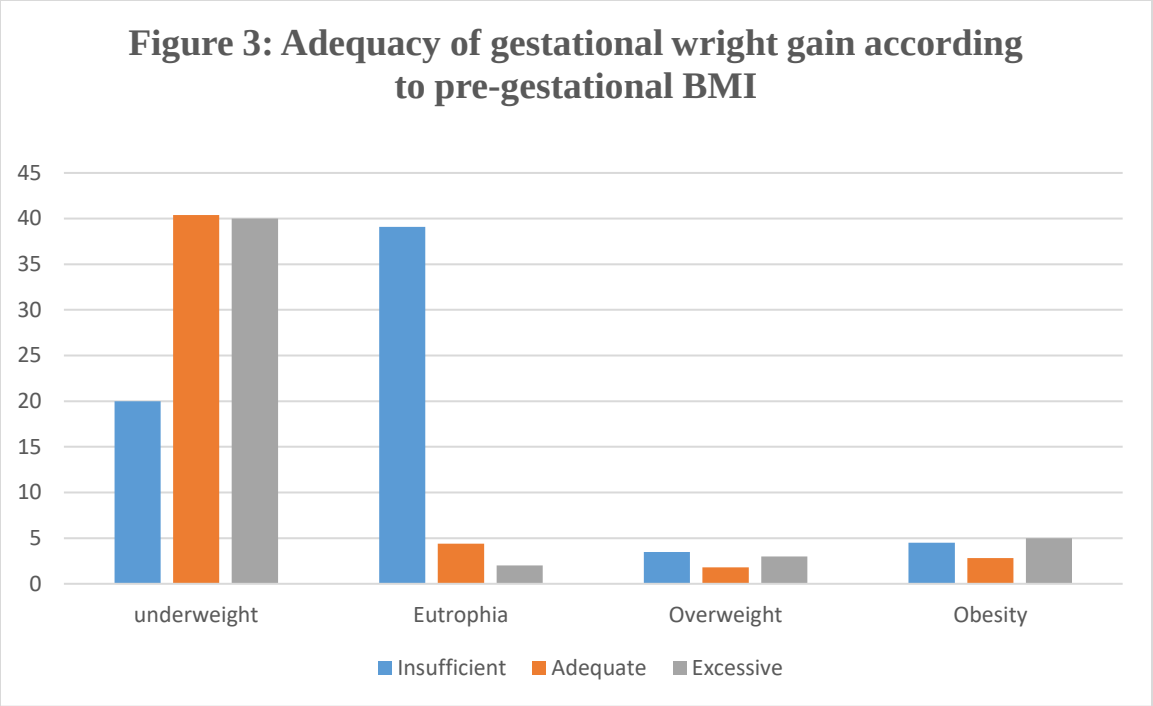


Figure 3: Adequacy of gestational wright gain according to pre-gestational BMI
45
40
35
30
25
20
15
10
5
0
underweight
Eutrophia
Overweight
Obesity
Insufficient
Adequate
Excessive

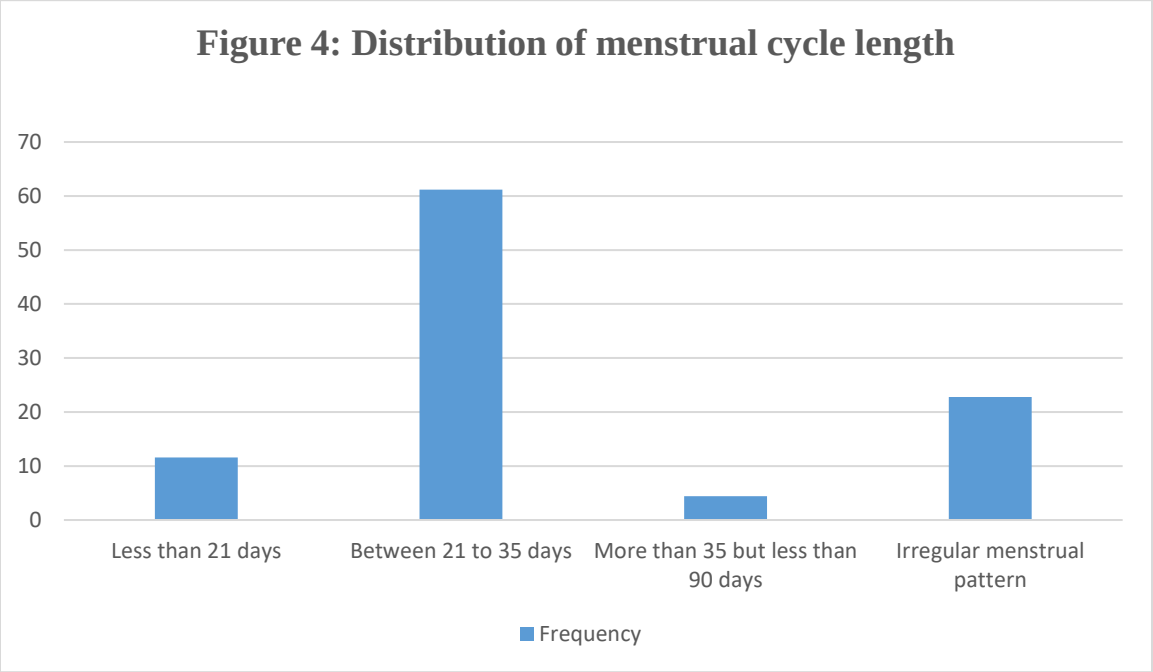
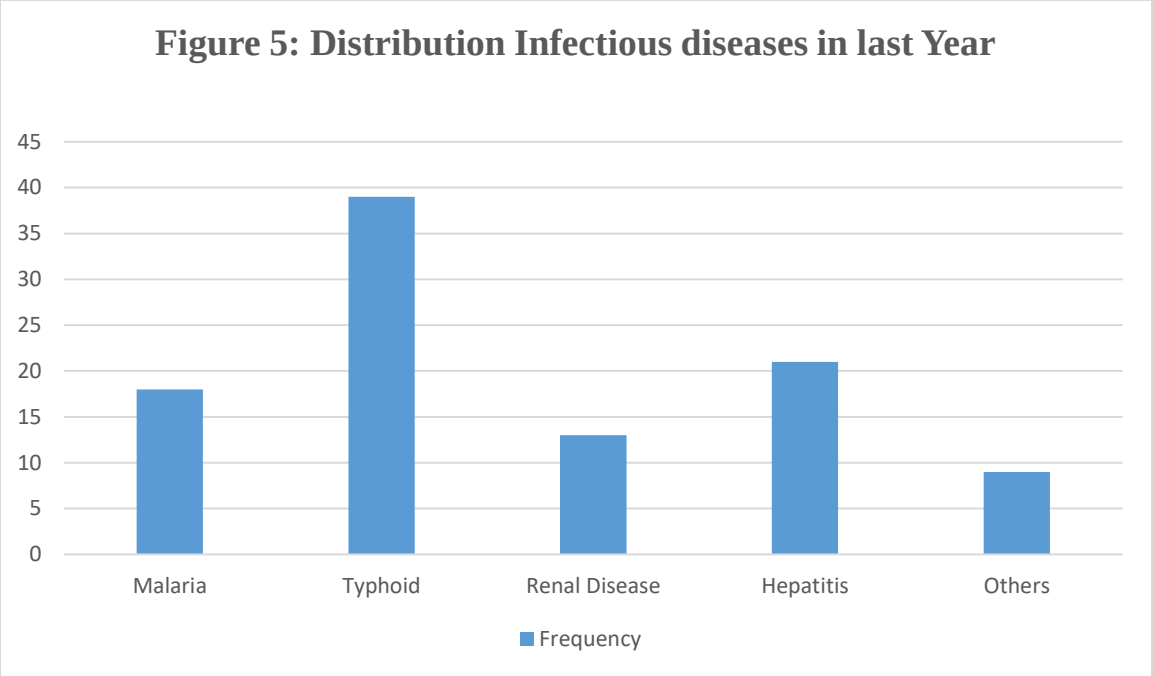


Figure 4: Distribution of menstrual cycle length
70
60
50
40
30
20
10
0
Less than 21 days
Between 21 to 35 days
More than 35 but less than 90 days
Irregular menstrual pattern
Frequency



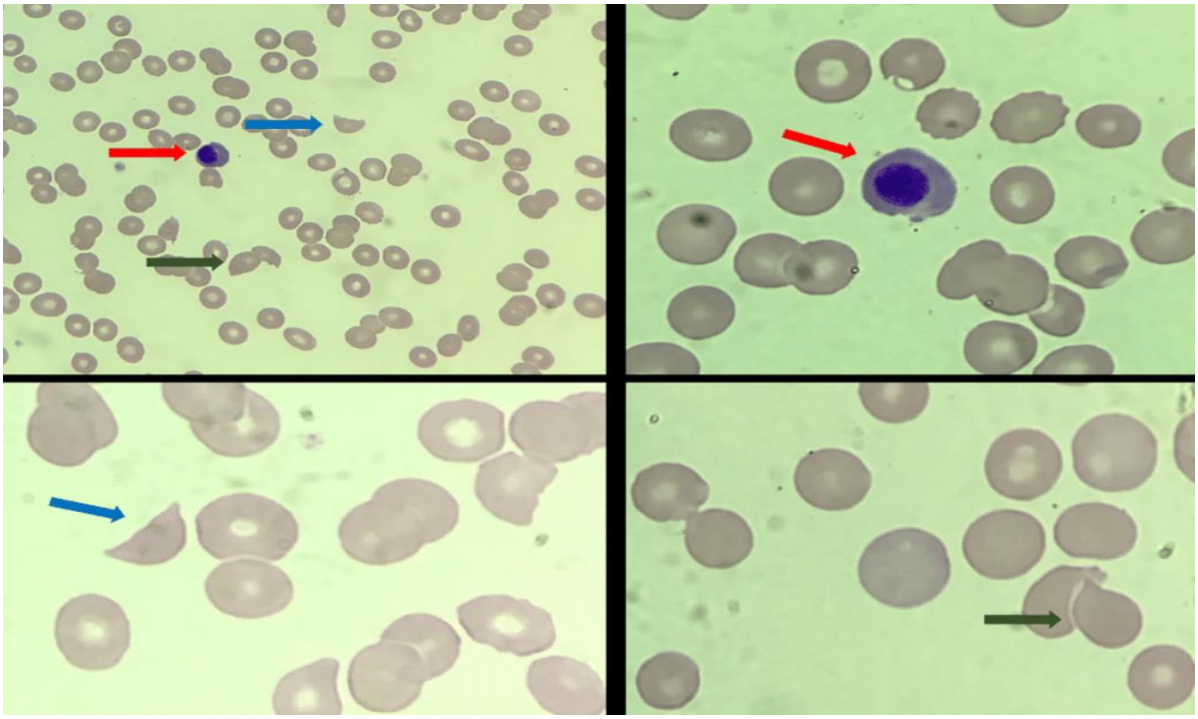


Figure: 6 Red Blood Cell Conditions in Anemic Pregnant Woman

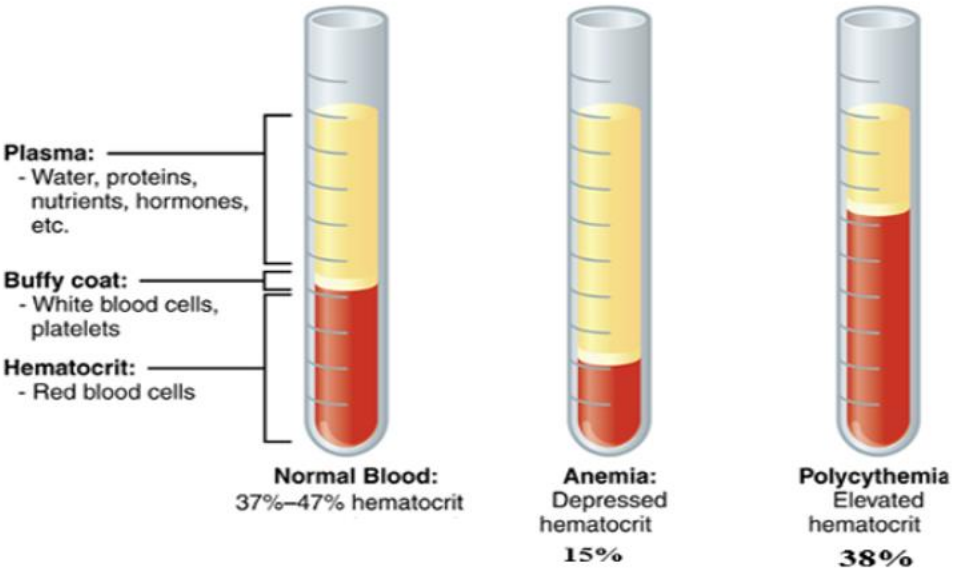


Figure 7: Hematocrit: High or Low

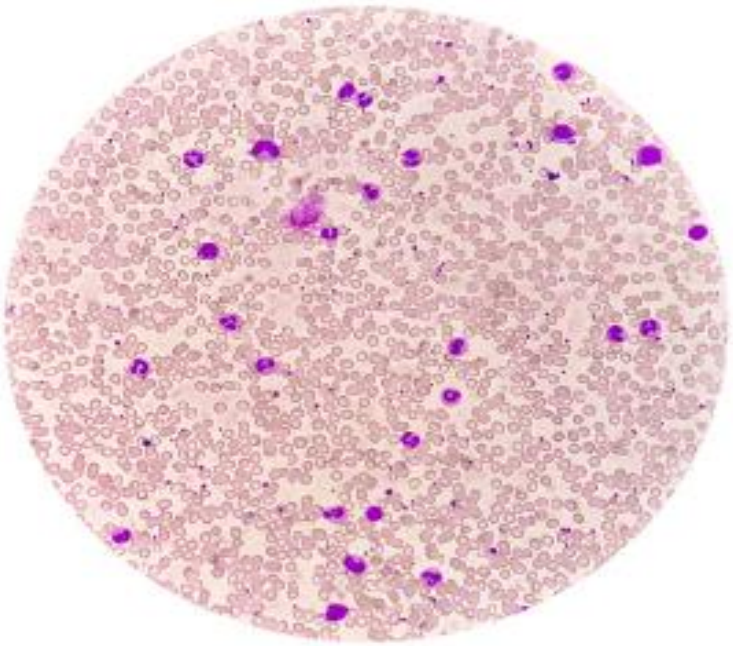


Figure 8: Hematocrit conditions in the Blood of Anemic Pregnant Woman

Discussion

The WHO classified anemia prevalence during the study of a moderate public health concern, similar to previous Ethiopian studies and national prevalence (21-22%). Iron deficiency was the most common cause, affecting 77% of participants. Socioeconomic factors, cultural practices, and nutritional lifestyles contribute towards regional variations in anemia prevalence [16]. Anemia was significantly associated with higher gravidity, with women having six or more children being twice as likely to develop anemia [17]. Family planning practices also impacted anemia rates, with higher prevalence in women with shorter birth intervals. Anemia in pregnancy is linked to increased risks of preterm delivery and intrauterine growth restriction (IUGR). Anemic women had a higher incidence of preterm delivery (7% vs. 5%) compared to non-anemic women. Although there was an inverse relationship between anemia severity and birth weight, the results were statistically significant. However, more anemic women reported IUGR compared to non-anemic women.

Conclusion

This study underscores the substantial public health challenge posed by anemia during pregnancy particularly iron deficiency anemia (IDA), which affects 77% of the participants. The prevalence of anemia is closely linked to socioeconomic factors and dietary habits. Lower income levels and inadequate nutritional intake contribute significantly to high rates of anemia among pregnant women. It also identifies higher gravidity and shorter birth intervals as key risk factors for developing anemia. Women with multiple pregnancies or those with closely spaced pregnancies are at an increased risk, suggesting need for targeted educational and medical interventions in this group. Anemia in pregnancy is associated with adverse pregnancy outcomes, including higher rates of preterm delivery and intrauterine growth restriction (IUGR). These conditions has serious risks to both maternal and fetal health, highlighting importance of addressing anemia effectively. To mitigate these risks, targeted interventions are essential. Iron supplementation emerges as a critical strategy in combating IDA. Ensuring pregnant women have access to iron supplements can significantly reduce prevalence of anemia and improve overall health outcomes. It enhancing antenatal care services is crucial. Regular monitoring and early detection of anemia can help manage the condition more effectively. Improved dietary guidance and education on nutrition are also vital components of a comprehensive approach to addressing anemia. Educating women on the importance of iron-rich foods and balanced diets can empower them to make healthier choices,

ultimately reducing the incidence of anemia. In conclusion, addressing anemia during pregnancy requires a multifaceted approach that includes iron supplementation, improved antenatal care, and enhanced nutritional education. By tackling the socioeconomic and dietary factors contributing to anemia, we can improve both maternal and fetal health outcomes, reducing the incidence of preterm delivery and IUGR. This study emphasizes the need for targeted public health interventions to combat anemia and ensure healthier pregnancies.

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