

A Study of Prevalence, Factors Associated with Anemia and Knowledge Attitude and Practice among Pregnant Women Attending Antenatal Clinics

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Abstract

Introduction: Anemia is a pressing global health concern, particularly affecting pregnant women. It is characterized by low hemoglobin levels and poses significant risks, including complications during pregnancy and childbirth. Despite efforts to combat anemia, its prevalence remains high, necessitating a comprehensive understanding of associated factors and their impact on pregnant women's knowledge, attitudes, and practices. In this study, we investigate the prevalence and severity of anemia, sociodemographic and obstetric determinants, dietary habits, and the overall awareness and behavior of pregnant women attending antenatal clinics at a tertiary care hospital.

Material and Methods: This prospective observational study, conducted at a Jamnagar hospital from May to August 2023, focuses on pregnant women attending antenatal clinics. Inclusion criteria involve consenting pregnant women, while exclusion criteria include those declining to participate or with specific medical conditions. We defined anemia levels based on hemoglobin concentrations. Data collection used a structured questionnaire, covering various aspects. Trained personnel collected blood samples for analysis, and data analysis included standard statistical procedures.

Results: Our study revealed a high anemia prevalence (75%) among pregnant women attending antenatal clinics, with 58.6% experiencing moderate anemia. Age, marital status, occupation, education, socio-economic class, residence, trimester, irregular menstrual cycles, low iron and folic acid (IFA) intake, and dietary habits significantly influenced anemia. While 79% of participants with irregular cycles had anemia, vegetarians exhibited prevalence of 86.7%. Conversely, non-vegetarian consumers had a relatively lower prevalence of 61.7%. Knowledge, attitudes, and practices related to anemia varied, emphasizing the need for tailored interventions.

Conclusion: Our findings underscore the importance of addressing sociodemographic factors and enhancing knowledge, attitudes, and practices to combat anemia effectively in this vulnerable population.

Keywords: Pregnant Women, Anemia, Prevalence, Factors.

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Introduction

Anemia is a global public health issue, and pregnant women are particularly vulnerable to it. It is characterized by low levels of hemoglobin, affecting individuals of all age groups. However, it poses a greater risk to pregnant women and young children. [1] The World Health Organization (WHO) has established a definition for anemia during pregnancy, specifying it as a condition where the hemoglobin (Hb) concentration falls below 11 g/dL. [2] Based on WHO pregnancy guidelines, anemia is classified into three severity levels according to hemoglobin levels: mild anemia (Hb 9 to 10.9g/dL), moderate anemia (Hb 7 to 8.9g/dL), and severe

anemia (Hb less than 7g/dL). Severe anemia, identified by Hb levels below 7g/dL, may lead to substantial maternal and fetal complications, including preterm birth, reduced birth weight, and various maternal health challenges. [3]

The worldwide prevalence of anemia in women of reproductive age stands at 29.9%, affecting more than 500 million women aged 15-49 years. [4] Recent studies have shown that the prevalence of anemia among pregnant women globally is 36.8%, with the highest occurrence being mild anemia at 70.8%. Notably, anemia is most common during the third trimester, with a prevalence rate of 48.8%. [5]

Iron deficiency is estimated to be responsible for about half of all cases of pregnancy-related anemia, although this proportion varies depending on local conditions. The most prevalent form of anemia worldwide is nutritional anemia, primarily caused by deficiencies in iron, folic acid, and vitamin B12. [6] During pregnancy, there is a substantial increase in the requirement for iron due to fetal development and the expansion of maternal red blood cell mass. Given the limited availability of iron from dietary sources, it becomes essential for pregnant women to receive iron and folic acid supplementation. [7]

Numerous sociocultural factors and obstetric parameters contribute to the prevalence of anemia in developing countries. [8] These factors include poverty, lack of awareness, poor dietary habits, and parasitic infestations. Additionally, anthropometric and dietary factors, including the consumption of essential nutrients, play a role in the occurrence of anemia. [9]

Despite the implementation of anemia prevention programs, such as India's Anemia Mukht Bharat program, the prevalence of anemia remains high. This highlights the need for a more in-depth understanding of the factors associated with anemia and their impact on the attitudes and practices of pregnant women. In this study, we aim to estimate the prevalence and severity of anemia, explore sociodemographic and obstetric factors, assess dietary habits, and examine knowledge, attitudes, and practices related to anemia among pregnant women attending antenatal clinics at a tertiary care hospital.

Material and Methods

This cross-sectional observational study, conducted between May and August 2023 at a single tertiary care hospital in Jamnagar, Gujarat, had several objectives. It aimed to estimate the prevalence of anemia among pregnant women attending antenatal clinics and determine the magnitude and severity of anemia in this group. Additionally, the study assessed sociodemographic and obstetric-related factors associated with anemia in pregnant women, examined the association of anemia with their dietary habits, and evaluated the knowledge, attitude, and practices of participants regarding anemia.

Inclusion criteria for this study encompass pregnant women attending the antenatal clinic at the Obstetrics and Gynecology Outpatient Department who willingly consent to participate. Conversely, exclusion criteria entail pregnant women who decline participation, those with non-singleton pregnancies, individuals testing positive for HIV, and those with underlying chronic kidney disease and/or chronic liver disease.

Operational definitions include categorizations such as anemic pregnant women, mild anemia in pregnancy, moderate anemia in pregnancy, and severe anemia in pregnancy based on WHO guideline's blood hemoglobin concentration ranges.^{10,11} According to WHO, anemia in pregnancy is defined as follows:

Anemic pregnant women: Those with blood hemoglobin concentration below 11 g/dl.

- Mild anemia in pregnancy: Hemoglobin concentration between 9-10.9 g/dl.
- Moderate anemia in pregnancy: Hemoglobin concentration between 7-8.9 g/dl.
- Severe anemia in pregnancy: Hemoglobin concentration less than 7 g/dl.

We employed a structured questionnaire, adapted from relevant literature and tailored to our context, to gather information on socio-demographic details, obstetric factors, anthropometric measurements, nutritional habits, knowledge, attitudes, and practices related to anemia. Data collectors underwent training to ensure objective, relevant, and confidential data collection.

The procedure for collecting venous blood samples for anemia assessment involved trained personnel through venipuncture into EDTA vacutainers. Hemoglobin levels were determined using automated analyzers, while hematocrit values were obtained by centrifuging capillary tubes sealed at one end. This comprehensive approach ensured the collection of high-quality blood samples for accurate anemia testing.

Data analysis involved preprocessing, descriptive and inferential statistics, calculation of anemia prevalence, and assessment of knowledge, attitudes, and practices using SPSS Statistics V21.0, following ethical approval. Ethical approval was obtained from the institutional ethics committee at M.P. Shah Government Medical College & Guru Gobind Singh Government Hospital, Jamnagar. Participants were informed of the voluntary nature of their participation, and written consent was obtained. Privacy and confidentiality were maintained throughout the study within the hospital premises.

Results

In present study, we observe the prevalence of anemia across different categories within several variables. Prevalence of anemia in pregnancy in our study group was found to be 75% of which 44 women (58.6%) of them had moderate anemia (Fig 1). Among those under 25 years of age, 84% are affected by anemia, while in the over-25 age group, 65% have anemia. In terms of occupation, 73.8% of housewives have anemia, as opposed to 81.25% of working individuals. Education-wise, 84.12% of illiterate individuals have anemia compared to

59.4% of literate individuals. Majority of the study participants belongs to lower socio-economic class (93%) of which presence of anemia reported in

77.4% of women. Finally, in terms of residence, 47% of rural inhabitants and 28% of urban dwellers have anemia.

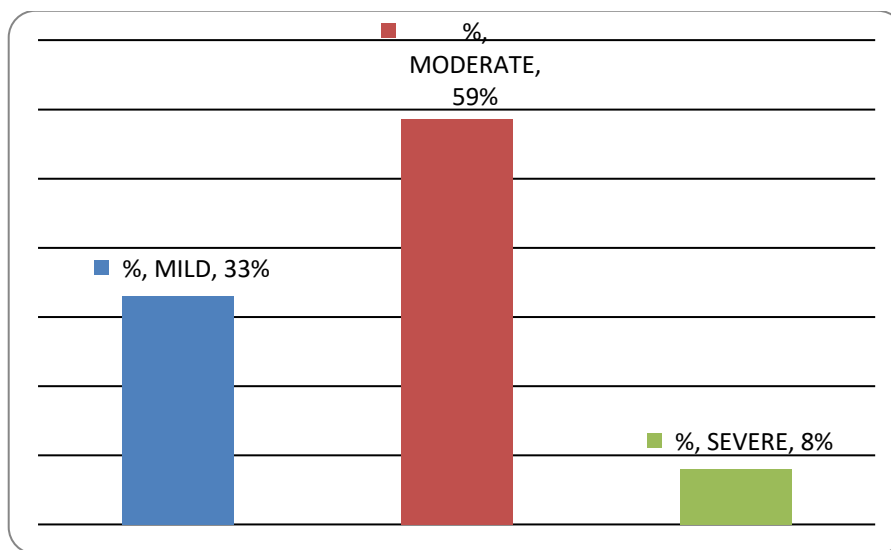


Figure 1:Prevalance of anaemia

In present study, among participants, 64 had their first pregnancy at age < 25 years, with 53(82.8%) of them experiencing anemia. In contrast, 36 participants had their first pregnancy at age > 25 years, with 22(61.1%) experiencing anemia. Maximum prevalence of anemia was seen in third

trimester where 36 women had anemia out of 45 (48% of total anemic population) followed by second trimester where 21 women out of 28 had anemia (28% of total anemic population) whereas only 18 women out of 27 (24% of total anemic population) had anemia in first trimester.

Table 1: Demographic Characteristics of Study Participants and Anemia Incidence

Variable	Category	Frequency	Presence of Anemia	Variable	Category	Frequency	Presence of Anemia
Age	< 25 years	51	43	Age at First Pregnancy	< 25 years	64	53
	> 25 years	49	32		> 25 years	36	22
Marital Status	Married	100	75	Trimester	First	27	18
	Divorced	0	-		Second	28	21
	Widow	0	-		Third	45	36
Occupation	Housewife	84	62	Parity	Primi	35	24
	Working	16	13		Multi	65	51
Education	Illiterate	63	53	Birth spacing (year)	<= 1	16	9
	Literate	37	22		> 1	49	42
Socio Economic Class	Upper class	7	3	History of contraception	Yes	38	28
	Lower class	93	72		No	62	47

In our study, 68 participants had regular menstrual cycles, and 47(69%) of them had anemia. Meanwhile, 32 participants reported irregular cycles, with 28(87.5%) experiencing anemia. Regarding iron and folic acid (IFA) intake, 4 took IFA before and during pregnancy, with 1(25%) having anemia, 72 took IFA only during pregnancy, and 52(72%)of them had anemia, while 24 participants didn't take IFA, and 22(91.6%)of them had anemia. Out of 17 participants with a history of chronic blood loss, 7(41%) individuals had anemia. Among 46 participants who had experienced anemia in previous pregnancies,41 (89%) had anemia in present pregnancy as well. For individuals with a history of blood transfusion in previous pregnancies,

32 participants had this history, and among them, 27(84.3%) had anemia in present pregnancy as well. Lastly, among 77 participants who had adequate weight gain during pregnancy, 56(72.7%) had anemia. On the other hand, among 23 participants with inadequate weight gain during pregnancy,19(82.6%) had anemia. In our study, prevalence of anemia was found higher in participants who were vegetarian. Out of 53 vegetarian participants 46(86.7%) had anemia and out of 47 participants with mixed dietary habits 29(61.7%) had anemia. Additionally, those participants who take IFA tablets with tea and not with citrus fruits tend to have a higher prevalence of anemia.

Table 2: Consumption of nutritional supplements, dietary habits, and the presence of anemia

Nutritional Supplement	Dietary Habit	Frequency	Presence of Anemia
Green Leafy Vegetable	Never/ very rarely	22	21
	<once/ week	44	36
	>once/ week	21	13
	Daily	13	5
Meat, Animal Product Intake	Never/ very rarely	53	46
	<once/week	27	18
	>once/week	20	11
Pulses, Legumes	Never/ very rarely	8	6
	<once/week	69	52
	>once/week	23	17
Tea intake immediately IFA Tabs	Yes	67	53
	No	33	22
Consumption of IFA with Citrus Fruits	Yes	26	13
	No	74	62

In our study, participants showed high awareness of "anemia" (79%) and the importance of antenatal visits (55%). They had moderate knowledge about contraception (41%), symptoms of anemia(41%) and hemoglobin-boosting foods (55%).The awareness of side effects associated with IFA (Iron and Folic Acid) was found to be 30% among the participants. Knowledge about the potential complications of anemia in pregnancy was limited

to only 15% of the participants, and information about its treatment was known by just 16% of them. Only26% of the participants preferred to consume IFA with citrus fruits. Most individuals (67%) opted to take IFA with milk/ tea, and 30% of them were aware of side effects of IFA tablets. However, a significant portion (47%) indicated that they might discontinue IFA without seeking medical advice.

Table 3: Assessment of knowledge attitude and practice of our participants

Assessment Points	Percentage of Participants
Knowledge	
Awareness of the term "anemia"	79%
Awareness of signs and symptoms of anemia	41%
Knowledge of the minimum required antenatal visits	55%
Knowledge of the importance and sources of foods for increasing blood hemoglobin levels	55%
Awareness of the importance of IFA tablets in preventing anemia	52%
Awareness of side effects of IFA	30%
Awareness of complications of anemia	15%
Awareness of basic treatment of anemia	16%
Attitude	
Participants who would stop IFA without consultation in case of any side effects	47%
Knowledge of different methods of contraception	41%
Knowledge of the minimum inter-pregnancy interval	52%
Practice	
Participants taking IFA with milk/tea	67%
Participants taking IFA with citrus fruits	26%
Participants with green leafy vegetables in diet	62%

Discussion

Anemia, characterized by a deficiency in the number or quality of red blood cells, is a pressing global health concern, particularly among pregnant women. During pregnancy, the demand for iron increases to support the growing fetus, making expectant mothers especially vulnerable to anemia. [12]

Our study revealed a high prevalence of anemia among pregnant women attending antenatal clinics,

with 75% affected, the majority having moderate anemia (58.6%). Comparing our findings with other studies, Balcha et al. [13] reported a lower prevalence (32.9%), potentially due to regional differences in healthcare and nutrition. Conversely, Saha et al. [14] 's study in Gujarat found a much higher prevalence (72.92%), highlighting regional disparities within the same country. Bansal et al. [15] reported a similar high prevalence (81.8%). Two additional Indian research studies have documented anemia prevalence rates of 62.3% and

64%, respectively. [16,17] The prevalence in Gujarat increased by 17.1 percentage points compared to 62.6% recorded in NFHS-4. [18] These variations underscore the need for tailored strategies considering regional factors, healthcare access, and nutrition to effectively combat anemia during pregnancy. Addressing this critical concern in maternal health requires region-specific approaches.

In our study, we found that among pregnant women, 84% of those under 25 years old and 65% of those over 25 had anemia. Majority of the women (77.4%) from lower socio economical class had anemia with a significantly higher prevalence of anemia was observed among illiterate (84.12%) individuals compared to their literate (59.4%) counterparts, with a majority of women from a lower socioeconomic class affected. Similarly, Oyelese et al. [19], Nair et al. [20], and Noronha et al. [21] all identified a trend of higher anemia prevalence in lower socioeconomic classes, although none of the studies found a statistically significant relationship between socioeconomic status and anemia prevalence. These findings collectively suggest a possible link between socioeconomic status and anemia, but other factors may also be at play, and the relationship lacks statistical significance in these studies.

The prevalence of anemia among pregnant women is a critical concern, and our study sought to shed light on the various factors influencing this condition. Age emerged as a significant determinant, with a striking 84% of pregnant women under 25 years experiencing anemia, while 65% of those over 25 were affected. The significance of age was emphasized by Saha et al. [14], who identified a similar pattern, underlining the need to consider age as a key factor in addressing anemia during pregnancy. Dutta et al. [22] 's review reinforced these findings, emphasizing the relevance of maternal age in anemia prevalence.

Trimester-specific variations in anemia prevalence were evident in our study, with the highest prevalence observed among participants in the third trimester (80%). This trend was corroborated by Saha et al.[14], whose study also identified a notably high prevalence in the third trimester. This commonality underscores the importance of monitoring anemia throughout pregnancy, with a particular focus on the later stages when the risk appears to be more pronounced.

Irregular menstrual cycles emerged as another noteworthy factor in our study, with 87.5% of participants reporting irregular cycles experiencing anemia. This observation resonates with Balcha et al.[13]'s findings, which suggested that rural residency and irregular menstruation were associated with anemia. Recognizing the influence of menstrual irregularity on anemia prevalence is

crucial for tailoring interventions to address this specific risk factor.

Our study highlighted the role of iron and folic acid (IFA) intake in anemia prevalence, with 91.6% of participants who did not take IFA supplements during pregnancy experiencing anemia. This finding aligns with Balcha et al. [13]'s identification of non-compliance with iron and folate supplements as a significant determinant of anemia. Furthermore, Amal A. El-Kholy et al. [23] 's study emphasized the potential impact of counseling to improve IFA regimen adherence, suggesting a promising avenue for reducing anemia prevalence.

Dietary habits also played a pivotal role in our study, with vegetarians exhibiting a significantly higher prevalence of anemia (86.7%). Our study concurs with Okube et al. [24] and Amal A. El-Kholy et al. [23], emphasizing the importance of iron folic acid (IFA) intake during pregnancy. Additionally, our study highlights the negative impact of consuming tea and coffee immediately after meals on iron absorption, underscoring the need for dietary guidance. Regarding dietary habits, we observed that individuals who consumed green leafy vegetables rarely or infrequently had a higher anemia prevalence (86.3%) compared to those who ate them regularly or daily (52.9%). This aligns with Gebreweld and Tsegaye²⁵'s findings, emphasizing the role of plant-based foods rich in non-heme iron in reducing anemia risk. Furthermore, our study revealed that individuals who avoided non-vegetarian diets had a comparatively higher anemia prevalence (86.7%) than those who included non-vegetarian options (61.7%). This finding corresponds with Gebreweld and Tsegaye's [25] results, highlighting the link between reduced non-vegetarian diet intake and anemia.

In our study, 79% were familiar with "anemia," 55% recognized antenatal visit importance, but only 41% knew anemia symptoms. Knowledge about contraception (41%) and dietary impact on hemoglobin (55%) was moderate. Most participants (67%) opted to take iron/folic acid with milk/ tea, while only 26% of them chose to take with citrus fruits. About 30% were aware of potential side effects, but 47% considered stopping IFA without consulting, with low awareness of complications (15%) and treatment (16%). Comparatively, our study results align with those of Yadav et al. [26] from Karnataka, revealing inadequate knowledge about anemia and healthy dietary practices among pregnant women. Similarly, Kelsay et al.'s [27] study also underscored the low nutritional awareness among pregnant women. A study conducted by Payghan et al. [28], comparing urban and rural mothers, indicated that rural mothers lacked awareness about the consequences of poor nutrition during pregnancy, consistent with our findings. In Pakistan, Ayesha et al. [29] found that,

although 66% of pregnant women were aware of anemia, only 21% attributed it to a deficiency in iron-rich foods. Their study also highlighted a general lack of knowledge regarding iron-rich dietary sources, mirroring our findings.

Numerous studies, including those by Maskey et al. [30] and Abdelnefez et al. [31], have identified factors such as education, age at marriage, socioeconomic status, limited knowledge, inadequate birth spacing, and a history of anemia before pregnancy as significant determinants of anemia. Dorairajan et al. [32] 's research in South India found that rural women's misconceptions about oral iron intake and the absence of adequate counseling by healthcare providers were significant predictors of anemia, aligning with our findings. Studies [32,33] indicate that women were more likely to adhere to iron and folic acid supplementation regimens when they received additional nutritional counseling during pregnancy. Notably, a study by Nivedita et al. [34] emphasized the necessity of nutritional counseling during pregnancy despite regular antenatal care, as they reported an 85% anemia prevalence in their study population. This underscores the importance of comprehensive approaches to address anemia.

Our study highlights the consistency of certain factors, such as age, trimester, menstrual cycles, IFA intake, and dietary habits, in influencing anemia prevalence during pregnancy. Understanding these shared determinants can inform the development of targeted interventions. However, it is essential to consider regional and socio-demographic variations when designing strategies to combat anemia among pregnant women. Additionally, efforts to promote knowledge and awareness of anemia and its risk factors are integral components of comprehensive initiatives aimed at reducing its prevalence during pregnancy.

Conclusion

Our study highlights the concerning prevalence of anemia among pregnant women, affecting 75% of participants, with the majority experiencing moderate anemia (58.6%). Regional disparities are evident, emphasizing the need for region-specific strategies to effectively combat anemia during pregnancy. Age emerged as a significant determinant, with 84% of those under 25 and 65% of those over 25 experiencing anemia. Our study identifies various factors influencing anemia among pregnant women: demographics (age, marital status, occupation, education, socio-economic class, residence), trimester-specific variations, irregular menstrual cycles, dietary choices, and iron and folic acid intake. Inadequate knowledge about anemia and its dietary implications persists. Key determinants include education, age at marriage, socioeconomic status, knowledge, birth spacing, and

previous anemia history. Tailored interventions and comprehensive approaches are essential to address maternal anemia effectively.

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