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Home Science

ANEMIA IN PREGNANCY: DISTRIBUTION AND ASSOCIATED FACTORS IN RANCHI DISTRICT

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ABSTRACT **Background:** Anemia is the most common hematological disorder during pregnancy, accounting for approximately 20% of maternal deaths. The World Health Organization estimates that the global prevalence of anemia among pregnant women is 55.9%, with India reporting rates between 33% and 89%. Contributing factors include inadequate intake of iron, folic acid, and vitamin B12, poor iron bioavailability due to phytate-rich diets, and chronic blood loss from infections such as malaria and hookworm. **Objectives:** To determine the distribution of anemia among pregnant women in District Ranchi, identify associated socio-demographic factors, and recommend suitable preventive and corrective measures. **Methods:** This hospital-based cross-sectional study involved 50 pregnant women aged 20-35 years, selected through simple random sampling. Data on socio-demographic profile, nutritional status, hemoglobin levels, clinical signs and symptoms, about anemia were collected and analyzed. **Results:** The majority of participants were aged 25-30 years (68%), Hindus (82%), from middle socio-economic status (72%), with education up to matric (44%), and living in joint families (60%). Among women aged 20-25 years, 7.33% had an energy deficit, 7.20% had an iron deficit, and 31.50% had a folic acid deficit. For women aged 25-30 years, 10.16% had an energy deficit, and 48.74% had a folic acid deficit. The mean hemoglobin levels declined from 9.54 ± 0.64 g/dl in the first trimester to 8.93 ± 0.61 g/dl in the second trimester, with a slight increase to 9.18 ± 0.58 g/dl in the third trimester, all below the WHO cutoff of <11 g/dl. Clinical signs such as conjunctival pallor (96%) and pallor of the tongue (90%) were prevalent in nearly all women across all trimesters. All participants exhibited symptoms of anemia, including tiredness (100%), irritability (86%), and headache (86%). **Conclusions:** Anemia remains a significant health concern among pregnant women in District Ranchi. Despite efforts, high prevalence persists, highlighting the need for improved screening, nutritional interventions, and health education to reduce anemia-related morbidity.

KEYWORDS : Anemia, Pregnancy, Hemoglobin Levels, And Socio-Demographic Factors

INTRODUCTION

Anemia remains the most prevalent hematological disorder encountered during pregnancy, characterized by a deficiency in red blood cells (RBCs) due to inadequate production, excessive destruction, or loss of RBCs (1). Globally, anemia accounts for approximately 20% of maternal deaths, underscoring its significant impact on maternal mortality and morbidity (2, 3). The condition also adversely affects fetal and neonatal outcomes, including increased risks of low birth weight, preterm birth, and developmental complications (4). In India, the burden of anemia is particularly severe, with prevalence rates ranging from 33% to 89% among pregnant women, primarily attributable to nutritional deficiencies, chronic blood loss due to infections such as malaria and hookworm, and poor dietary intake of essential nutrients like iron, folic acid, and vitamin B12 (5, 6).

The high prevalence of anemia in India is compounded by low dietary iron intake—less than 20 mg/day—and poor bioavailability of nutrients in phytate-rich diets, which hampers absorption. Moreover, inadequate screening and treatment during pregnancy exacerbate the problem. The condition predominantly affects women of reproductive age, with nutritional anemia resulting from insufficient supply of nutrients necessary for erythropoiesis and hemoglobin synthesis. Iron deficiency is recognized as the primary etiological factor responsible for nutritional anemia in the community (4).

Epidemiological data from various national surveys highlight the extensive scope of anemia in India. The World Health Organization estimates that over 50% of pregnant women in developing countries are affected by anemia, with India exhibiting some of the highest prevalence rates globally—ranging from 65% to 75% (3, 4). Multiple large-scale surveys, including the National Family Health Survey (NFHS), and the Indian Council of Medical Research (ICMR) Micronutrient Surveys, consistently report that over 70% of preschool children and pregnant women suffer from anemia, indicating its early onset and persistence across age groups (7, 8).

Despite longstanding nutritional programs like the National Anemia Prophylaxis Programme initiated in 1973, the prevalence of anemia has shown little decline over recent decades, highlighting the need for intensified prevention strategies(8). Recent NFHS data reveal that more than half of women aged 15-49 years are anemic, with prevalence rates rising slightly over the years, and a significant proportion suffering from moderate to severe anemia (9). The evolving data underscore the persistent challenge anemia poses to maternal and child health in India, necessitating targeted interventions to address underlying nutritional deficiencies and improve health outcomes.

The rationale for this study stems from the high burden of anemia among pregnant women, especially in regions like Ranchi, where nutritional deficiencies and limited awareness contribute to its persistence. Understanding the prevalence and socio-demographic determinants can help tailor targeted interventions. Furthermore, evaluating the KAP regarding anemia will identify gaps in awareness and practices, guiding health education and community-based strategies to reduce the burden. Ultimately, the study seeks to contribute valuable data to inform health policies and improve maternal health outcomes through effective prevention and management of anemia during pregnancy.

The primary objective of this hospital-based study was to determine the prevalence of anemia among pregnant women aged 20 to 35 years in District Ranchi. Additionally, the study aimed to identify socio-demographic factors associated with anemia, and propose effective preventive and corrective measures.

METHODOLOGY

This study was conducted among pregnant women aged 20 to 35 years belonging to low and middle-income groups. It was a descriptive cross-sectional study carried out at the Government Hospital, RIMS, Bariatu, Ranchi, Jharkhand between November 2023 and March 2024. Ethical committee approval was taken before the start of the study and informed consent was obtained from all the participants. Participants were selected through purposive sampling, with all pregnant women attending the hospital regularly in their first, second, or third trimesters included in the study. Selection was further refined using simple random sampling from this eligible population. The study excluded pregnant women below 20 years and above 35 years of age, as well as those with complicated pregnancies. Given that the hospital primarily serves patients from low and middle-income backgrounds, cases from high-income groups were rarely seen and thus excluded. The inclusion criteria focused on women within the specified age range with normal, uncomplicated pregnancies, predominantly from lower and middle-income groups. A pre-designed and pre-tested questionnaire was used to interview the study participants.

A pregnant mother with Hb level less than 11 gm/dl was considered as anemic (10) Weight and height were measured according to a standard protocol [11, 12]. During pregnancy, weight was measured by using an electronic weighing balance Seca to the nearest 0.1 kg. Height was

measured in centimetres using a Seca toise, with a length of 2 m graduated in centimeters and with a precision of 0.1 cm. Pregnant women were asked to maintain an upright and erect posture with their feet together and the back of their heels touching the pole of the anthropometer. The height was measured when the horizontal headpiece was lowered onto the women's head.

Data analysis was performed using SPSS version 21.0, employing descriptive statistics to present socio-demographic characteristics such as age, religion, and income status. Cross-tabulation techniques were used to explore associations between different variables.

RESULTS

1. General Information :

Mean ± Sd of Age = 25.62±2.18 yrs, Age Range = 20 – 30 yrs

Table - 1.1: Distribution of Subjects According to Biosocial & Demographic Characteristics

Characteristic	Category	No.	%
Age Group	20 - 25 yr	16	32
	25 - 30 yr	34	68
Religion	Hindu	41	82.0
	Muslim	9	18.0
Economic Status	Middle	36	72.0
	Low	14	28.0
Education	Illiterate	13	26.0
	Matric	22	44.0
	Intermediate	6	12.0
	Graduate & above	9	18.0
Type of Family	Nuclear	20	40.0
	Joint	30	60.0
Total		50	100.0

The data presented in the table-2 explains about the Biosocial & Demographic data of subjects based on age, religion, economic status, education and type of family. It shows that majority of the subjects were from age group of 25-30 years (68%) were Hindus (82%), had middle economic status (72%) , had education level of matric (44%) and lived in joint families (60%).

2. Nutritional Status of Pregnant Women :

Anthropometric Measurements :

Table 2.1 Anthropometric Measurements of Subjects

Measurement	Mean	SD
WEIGHT (k.g)	56.88	5.93
HEIGHT (Meter)	1.58	0.04

The average weight of the subjects under study was 56.88±5.93 kgs and height was 1.58±0.04 meters.

Assessment of Dietary Intake by 24 hrs Recall Method :

Table 2.2 : Nutritional Status of Subjects for the Age group 20 – 25 yrs

Nutrient	Mean	RDA (ICMR)	% consumption of RDA	% Excsse	% Deficit
ENERGY (Kcal)	2015.55	2175.00	92.67		7.33
PROTEIN (Gm)	72.97	65.00	112.26	12.26	
FAT (Gm)	44.49	30.00	148.31	48.31	
IRON (Mg)	35.26	38.00	92.80		7.20
FREE FOLIC ACID (Mcg)	273.98	400.00	68.50		31.50
VIT-C (Mg)	163.48	40.00	408.69	308.69	

The above table depict that the pregnant women of age group 20 – 25 years had consumed 92.67% of energy, 112.26% of protein, 148.31% of fat, 92.80% of iron, 68.50% of free folic acid and 408.69 % of Vit-C. They showed 7.33% energy deficit, 7.20% iron deficit and 31.50% of free folic acid deficit. Rest was normal.

Table 2.3 Nutritional Status of Subjects for the Age group 25 – 30 yrs

Nutrient	Mean	RDA (ICMR)	% consumption of RDA	% Excsse	% Deficit
ENERGY (Kcal)	1954.02	2175.00	89.84		10.16
PROTEIN (Gm)	68.40	65.00	105.24	5.24	
FAT (Gm)	46.46	30.00	154.88	54.88	
IRON (Mg)	40.81	38.00	107.38	7.38	
FREE FOLIC ACID (Mcg)	205.05	400.00	51.26		48.74
VIT-C (Mg)	151.25	40.00	378.13	278.13	

The above table depict that the pregnant women of age group 25 – 30 years had consumed 89.84% of energy, 105.24% of protein, 154.88% of fat, 107.38% of iron, 51.26% of free folic acid and 378.13 % of Vit-C. They showed 10.16% energy deficit and 48.74% of free folic acid deficit. Rest was normal.

3. Percentage of Anaemia among Subjects

Table 3.1 Hemoglobin Status of Subjects

PREGNANCY TRIMESTER	HB LEVEL (G/DL)	
	Mean	SD
1 st	9.54	0.64
2 nd	8.93	0.61
3 rd	9.18	0.58
Total	9.17	0.61

Among the pregnant women the mean hemoglobin level in 1st trimester was found to be 9.54±0.64 g/dl which was reduced to 8.93±0.61 g/dl in second trimester and in third trimester it was 9.18±0.58 g/dl. So on average the pregnant women were found to be anemic in all the trimesters.

Table 3.2 Clinical Signs of Anaemia

CLINICAL SIGN OF ANAEMIA		PREGNANCY TRIMISTER			Total
		1 st	2 nd	3 rd	
	No.	7	12	30	49
	%	100.0%	100.0%	96.8%	98.0%
PALENESS OF CONJUNCTIVA	No.	7	11	30	48
	%	100.0%	91.7%	96.8%	96.0%
PALENESS OF TONGUE	No.	4	11	30	45
	%	57.1%	91.7%	96.8%	90.0%
PALENESS OF NAIL BED	No.	0	9	8	17
	%	.0%	75.0%	25.8%	34.0%
PALENESS AND DECREADED PINKNESS OF THE LIPS	No.	5	10	19	34
	%	71.4%	83.3%	61.3%	68.0%
SPOON SHAPED IN NAILS	No.	0	0	1	1
	%	.0%	.0%	3.2%	2.0%
SWELLING OF FEET IN SEVERE	No.	0	0	1	1
	%	.0%	.0%	3.2%	2.0%
Total	No.	7	12	31	50
	%	14.0%	24.0%	62.0%	100.0%

All the women shows the clinical signs of anemia in the first and second trimester (100%) and 98% in the third trimester. Most of them showed paleness of conjunctiva (96%) and paleness of tongue (90.0%).

Table 3.3 Clinical Symptoms of Anaemia

SYMPTOMS OF ANAEMIA		PREGNANCY TRIMISTER			Total
		1 st	2 nd	3 rd	
	No.	7	12	31	50
	%	100.0%	100.0%	100.0%	100.0%
TIREDNESS	No.	7	12	31	50
	%	100.0%	100.0%	100.0%	100.0%
IRRITABILITY	No.	6	11	26	43
	%	85.7%	91.7%	83.9%	86.0%
HEADACHE	No.	4	11	28	43
	%	57.1%	91.7%	90.3%	86.0%
DIZZINESS	No.	2	9	22	33
	%	28.6%	75.0%	71.0%	66.0%
NERVOUSNESS	No.	0	0	0	0
	%	.0%	.0%	.0%	.0%
LOSS OF APPETITE	No.	2	1	9	12
	%	28.6%	8.3%	29.0%	24.0%
POOR ATTENTION	No.	0	0	0	0
	%	.0%	.0%	.0%	.0%
RAPID HEART BEAT	No.	0	0	0	0
	%	.0%	.0%	.0%	.0%
INFLAMMED, SORE TONGUE	No.	2	0	1	3
	%	28.6%	.0%	3.2%	6.0%

Total	No.	7	12	31	50
	%	14.0%	24.0%	62.0%	100.0%

All the women showed the symptoms of anemia in all the trimesters (100%). Most of them showed tiredness (100%), irritability (86%) and headache (86%).

DISCUSSION

Anemia remains the most prevalent hematological disorder encountered during pregnancy. Approximately 20% of maternal deaths are attributed to anemia (1). The World Health Organization estimates that the global prevalence of anemia among pregnant women is 55.9%, and in India, the prevalence ranges from 33% to 89% (5). Contributing factors include inadequate dietary intake of iron, folic acid, and vitamin B12, poor bioavailability of iron due to phytate-rich Indian diets, and chronic blood loss resulting from infections such as malaria and hookworm.

This study aimed to assess the anemia status among pregnant women and explore the associated socio-demographic factors. The findings reveal a high prevalence of anemia, indicating that it remains a significant public health issue. Despite years of implementing anemia control programs, the magnitude of the problem persists, suggesting these initiatives have largely been ineffective. This could be due to inadequate monitoring and evaluation of supplementation efforts, as most pregnant women are not screened early for anemia nor provided with appropriate treatment.

1. General Information:
In this study, a majority of pregnant women were aged between 25-30 years (68%), belonged to middle socio-economic status (72%), had education up to the matric level (44%), and resided in joint families (60%). Similar observations were reported by Noronha et al. (2008) (13) and Bharati et al. (2008) (14), who also documented high rates of anemia among young pregnant women from lower socio-economic backgrounds and joint family systems.

2. Nutritional Status of Pregnant Women:
Anthropometric measurements indicated that the mean weight of the pregnant women was 56.88 ± 5.93 kg, and the average height was 1.58 ± 0.04 meters. Maternal weight and parental height are recognized as important determinants of intrauterine growth and birth weight (4).

3. Distribution of Anemia Among Subjects:
The mean hemoglobin level during the first trimester was 9.54 ± 0.64 g/dl, which declined to 8.93 ± 0.61 g/dl in the second trimester and slightly increased to 9.18 ± 0.58 g/dl in the third trimester. These values are below the WHO cutoff for anemia (<11 g/dl) (10).

A majority of the women exhibited clinical signs such as conjunctival pallor (96%) and pallor of the tongue (90%). A recent literature review identified 6,457 studies, with 14 included—focused on pregnant women, hospitalized patients, or the general population. Diagnostic accuracy for pallor assessments varied widely: conjunctiva (sensitivity 19–97%, specificity 65–100%), nailbeds (41–65%, 58–93%), and palms (33–91%, 54–93%). Examining nine or more sites improved sensitivity (73.8–82.9%) and specificity (76.0–90.9%). No single technique proved superior; combined assessments offer better accuracy but require balancing with examination time (15). However, this study has certain limitations, including its hospital-based design, which may restrict the generalizability of the results to the broader population. Additionally, the purposive sampling method and exclusion of women with complicated pregnancies might have introduced selection bias. The cross-sectional nature of the study also limits the ability to establish causal relationships. Reliance on self-reported data that may lead to recall bias, variability in hemoglobin measurement methods, and exclusion of women with pre-existing conditions that may underestimate the true burden. It also did not examine all possible factors influencing anemia, and its limited timeframe means seasonal variations were not considered, affecting the overall applicability of the findings. Further longitudinal studies are recommended to better understand causal relationships and seasonal variations affecting anemia, which can inform more targeted interventions in the future.

CONCLUSION

The present study revealed a high percentage of anemia among pregnant women belonging to low socioeconomic and educational backgrounds, highlighting that anemia continues to be a major public health problem. This underscores the urgent need for targeted interventions to improve awareness, nutrition, and healthcare access among vulnerable populations to reduce the burden of anemia in this group.

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