International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Prevalence and Determinants of Anemia in Pregnant Women and its Adverse Outcomes in a Tertiary Care Hospital: A Prospective Observational Study

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ABSTRACT

The main objective of the research is to evaluate the prevalence and contributing factors of anemia during pregnancy. The study also sought to identify the negative effects of anemia during pregnancy. A total of 120 expectant mothers visiting the antenatal care having Complete Blood Count reports were included, then through a prepared questionnaire, determinants and adverse outcomes of anemia were evaluated. Chi square test was used to analyse the data. Statistical significance was defined as a P value of ≤0.05. The overall prevalence of anemia was (58%) and the most prevalent cause was due to iron deficiency (78.5%). High number of moderate anemia (61.4%) cases were observed. Age, rural areas, socioeconomic status, mother's occupation, education, current pregnancy trimester, religion, interval between pregnancies, information about anaemia, iron supplementation intake, vegetarian diet, eating fruits and vegetables, and drinking tea or coffee after meals were the determinants showed a P value of ≤0.05. Preterm labor, severe postpartum hemorrhage, increased ICU admission, low birth weighted baby and preterm birth were the adverse feto-maternal outcomes reported. This research examined the prevalence and determinants of anemia and its adverse outcomes among pregnant women and it was found a larger burden of maternal iron deficiency anemia posing concern for both the expecting mother and new-born specially in rural areas of India majorly due to poverty.

Keywords: Maternal anemia; Prevalence; Iron deficiency anemia; Risk factors; Feto-maternal outcome.

INTRODUCTION

Anemia is a highly frequent type of nutritional insufficiency worldwide, especially in countries with limited resources like India [1]. When the erythrocytes ability to carry oxygen is diminished, the body cannot produce enough of them to meet its basic requirements. This disease is known as anaemia [2].

The frequency of anaemia in maternal Indian women is 49.7 %, similar to the global incidence of 41.8 % (WHO 2008). Regardless of severity, In Asia, anaemia is the 2nd leading reason for maternal death accounting for 12.8% of maternal mortality in cases when postpartum haemorrhage is not a factor. Approximately 80% of South Asian maternal mortality from anaemia are attributable to India [3].

Pregnancy-related anemia is a major public health concern [4].

A plasma hemoglobin level of 11 g/100 ml or less is considered anemia in pregnancy, according to the WHO [5].

Haemoglobin concentrations below 7.0 g/dl are regarded as severe during pregnancy, moderate falls between 7.0 and 9.9 g/dl, and mild anaemia occurs between 10.0 and 11 g/dl [4].

Iron deficiency is regarded to be the dominant and frequent cause of anemia [6]. An increased need for iron occurs during pregnancy. It is specifically needed to supplement by roughly 1,000 mg, of which 300 mg are for the foetus and placenta, 500 mg is for the increased levels of hemoglobin in mother, and 200 mg are to offset excretion [7]. In India, pregnant women have one of the highest rates of iron deficiency worldwide. Severe feto-maternal outcomes result from untreated iron deficiency anemia [8].

Maternal morbidity and mortality risks associated with iron deficiency anaemia include general health problems, poor recovery after delivery, prolonged hospital stays, infections, preterm contractions, eclampsia, an amniotic fluid embolism, postpartum haemorrhage (PPH), deep vein thrombosis (DVT), heart failure, and maternal mortality [9]. Foetal problems encompass a low birth weight of newborn, restricted intrauterine growth, preterm birth, and infant mortality [10].

The National Nutritional Anaemia Control Programme was implemented by India, the first developing nation, to avoid anaemia in expectant mothers. In the second trimester, the Indian government advises preventive supplementation with 100 mg of elemental iron plus 500 ug of folic acid for at least 100 days. This dosage should be doubled for the treatment of anaemia, resulting in 200 mg of elemental iron plus 1000 ug of folic acid. In India, anaemia prevalence is 65–75% despite these efforts [11].

Therefore, the present prospective observational study was done with the following aim and objectives:

- To determine the prevalence of anaemia (Hb <11 g/dl) among expectant mothers attending antenatal clinic.
- To figure out the predominance of mild, moderate, severe and iron deficiency anaemia.
- To figure out the occurence of anaemia during 1st, 2nd and 3rd trimester of pregnancy.
- To evaluate the importance of early diagnosis and treatment.
- To determine and research the association between anaemia and risk variables which could guide upcoming research and intervention.
- To look at the connection among anaemia severity and the chance of unfavourable consequences for both the mother and the foetus.
- To counsel the women attending antenatal care regarding anaemia, its risk factors, maternal-neonatal risks so as to prevent later obstetrical complications.

MATERIALS AND METHODS

Study design and location

The research adopted a prospective study design which was conducted at Shadan Hospital and Research Centre, Peerancheru, Hyderabad.

Sample size and sampling technique

A total of 120 pregnant women attending the obstetrics and gynaecology department for antenatal care were included in this study. Pregnant women having Complete Blood Count reports were chosen for sampling and data was gathered regarding the correlation of pregnant women with anemia, on a daily basis during the duration of the study.

Inclusion criteria

- Pregnant women who are willing to participate.

- Pregnant women visiting department of antenatal care who filled the consent form and having their Complete Blood Count report.

Exclusion criteria

- Pregnant women with cardiac, renal or hepatic diseases, diabetes mellitus, hypertension was excluded.
- Unwilling pregnant women and who do not have Complete Blood Count report with them were excluded.

Study procedure

Collection of diagnostic report

Since hemoglobin concentration is the main, most accurate, and affordable indicator of anaemia, a hemoglobin report was collected from all pregnant women receiving antenatal care. Also the Peripheral blood smear was noted as to assess the type and cause of anemia in pregnancy.

Categorisation of anemia based on WHO criteria

Depending on their serum Hb levels, expectant mothers was split in two distinct groups. Based on WHO guidelines, Hb levels <11 gram/decilitre were classified as anemic, and those >11 gram/decilitre as non-anemic.Gestational anemia was further categorized based on severity following the measurement of hemoglobin concentration as:

Mild: 10 – 10.9 gram/deciliter

Moderate: 7.0 – 9.9 gram/deciliter

Severe: less than 7.0 gram/deciliter

Data collection procedure

After obtaining each participant's consent form, the data was complied from them using a carefully designed questionnaire that a gynecologist verified. The questionnaire is divided into 5 sections, each of which has questions to figure out the frequency, contributing factors and adverse feto—maternal consequences related to anemia.

Study variables

- Sociodemographic factors (age, residence, educational status, occupation, income status, religion)
- Clinical and obstetric factors (gravida, trimester of current pregnancy, number of deliveries, number of living children, type of previous delivery, birth interval, number of abortion, iron supplementation, H/O of anaemia, H/O of RBC transfusion., H/O medical illness, current medication)
- Laboratory factors (Hb concentration)
- Dietary factors (dietary pattern, consumption of fruits, vegetables, tea/coffee, smokeless tobacco products)
- Maternal-fetal complications related to anaemia (preterm labor, preeclampsia, severe postpartum hemorrhage, increased ICU admission; Low weight newborn, premature birth, fetal distress)

Data analysis

Data from Complete blood count report and questionnaire responses were assembled, tabulated and calculated using MS Excel. Chi square analysis was done for showing relationship between anemia and the research variables by using SPSS software V.29 software. Statistical significance was defined by a P value of ≤ 0.05.

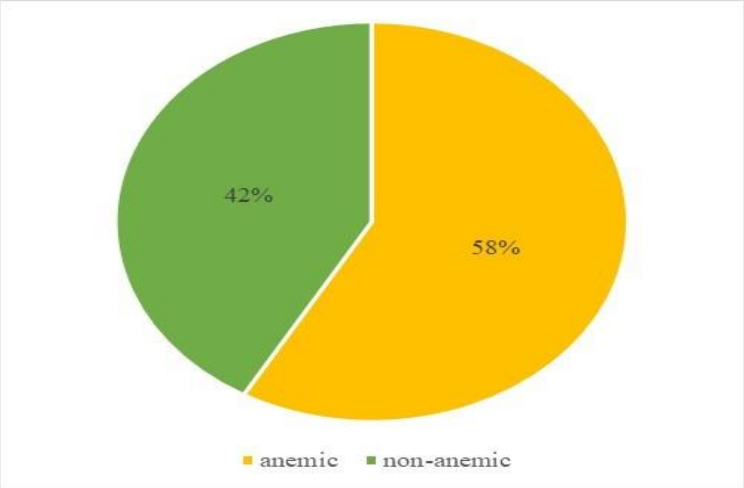
RESULTS

Prevalence of anemia

This study involved 120 pregnant women in total. According to WHO guidelines for anaemia categorizat-

ion in pregnancy, 70 (58%) were anaemic and 50 (42%) were non-anemic as shown in Figure 1.

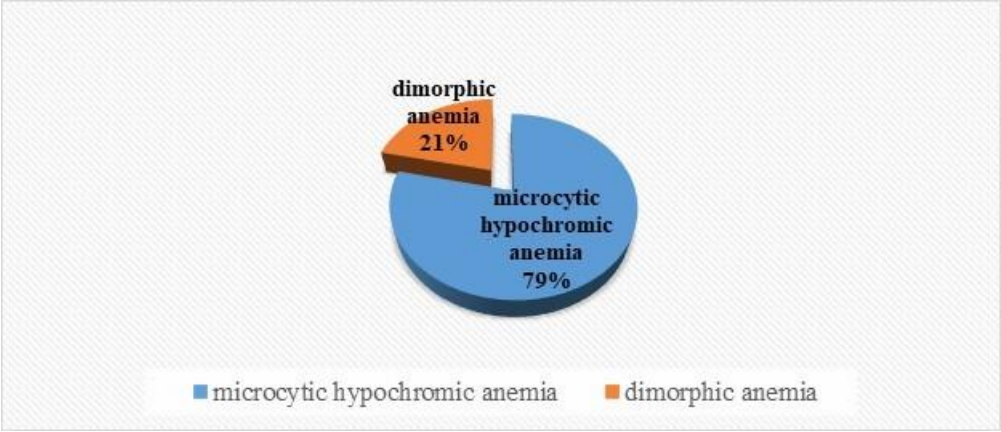
Figure 1. A Pie Chart Showing Prevalence of Anemia



Prevalence of anemia by peripheral smear study

55(78.5%) pregnant anemic women's peripheral blood smear (PBS) showed microcytic/hypochromic with anisocytopoikilocytosis anemia with reduced MCV, serum iron and ferritin and alternatively increased TIBC levels. Figure 2 indicate that iron deficiency anemia was more prevalent in pregnant women with anemia.

Figure 2. A 3D Pie Chart Showing Prevalence Of Anemia By Peripheral Smear Study



Prevalence of anemia according to severity

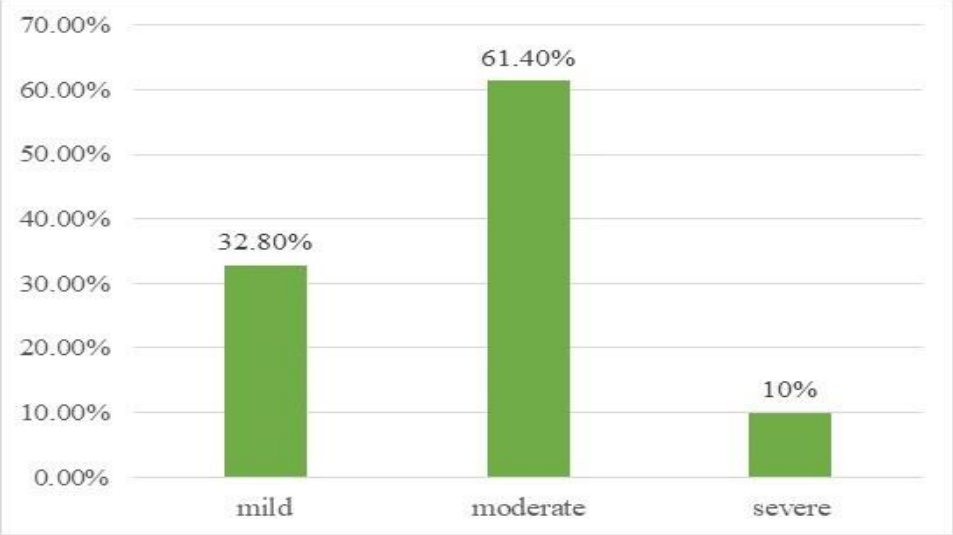
Overall prevalence of anemia was found to be 58% (70). Out of which 32.8% (23), 61.4% (43) and 10% (4) cases were mild, moderate and severe respectively based on WHO classification of anemia in pregnancy according to levels of severity as shown in Figure 3.

Mild: 10-10.9 g/dl

Moderate: 7.0-9.9 g/dl

Severe: <7.0 g/dl

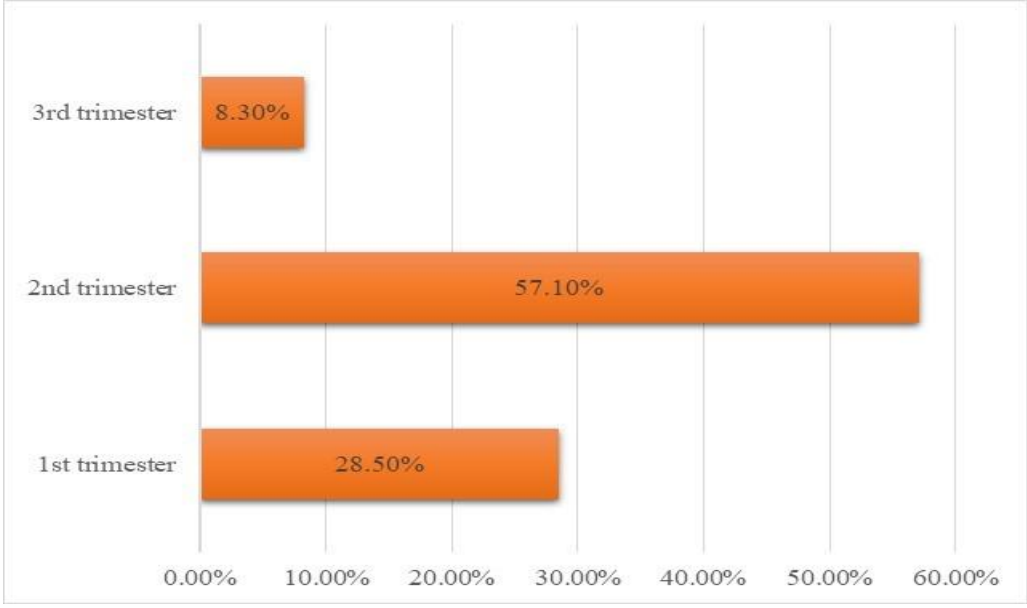
Figure 3. A 2D Column Chart Showing Prevalence Of Anemia According To Severity



Prevalence of anemia by trimester

According to the trimester, the prevalence of anemia was found to be 28.50% (20), 57.10% (40) and 8.30% (10) during 1st, 2nd and 3rd trimester respectively out of the total prevalence that is 70 of anemic cases as shown in Figure 4.

Figure 4. A 2D Bar Chart Showing Prevalence Of Anemia By Trimester



Association of anemia with sociodemographic factors:

A total of 120 expecting women were in this study. Mass of the participants 42 (35%), were of the age 26 to 30 years. It was noted that 80 (66.6%) were residing in rural areas, while majority 65 (54.1%) had attended secondary education. In addition, 90 (75%) were housewives, 65 (54.1%) were Hindu by religion, 60 (50%) had average monthly income of 1000-5000 as shown in Table 1.

Table 1: Association of Sociodemographic Factors with Anemia, And Calculation of P Value Using Chi Square Test.

Sociodemographic factors	Anemic (%)	Non-anemic (%)	Total (%)	Chi square (x2) value	P value
1. Age of mother(years) **a. <20** **b. 20-25** **c. 26-30** **d. 31-35** **e. >35**	 3 (4.2%) 30 (42.8%) 20 (28.5%) 10 (14.2%) 7 (10%)	 2 (4%) 4 (8%) 22 (44%) 12 (24%) 10 (20%)	 5 (4.17%) 34 (28.3%) 42 (35%) 22 (18.3%) 17(14.17%)	18.05	0.001
2. Residence **a. Rural** **b. Urban**	 45 (64.2%) 25 (35.7%)	 35 (70%) 15 (30%)	 80 (66.6%) 40 (33.3%)	5.69	0.01
3. Educational status? **a. Primary school** **b. Secondary school** **c. Graduate** **d. Masters**	 20 (28.5%) 40 (57.1%) 5 (7.14%) 5 (7.14%)	 10 (20%) 25 (50%) 10 (20%) 5 (10%)	 30 (25%) 65(54.17%) 15 (12.5%) 10 (8.3%)	11.19	0.01
4. Occupation? **a. Housewife** **b. Employed** **c. Unemployed** **d. Student**	 60 (85.7%) 10 (14.2%) 0 0	 30 (60%) 20 (40%) 0 0	 90 (75%) 20 (16.6%) 0 0	10.28	0.01
5. Income status? **a. <1000** **b. 1000-5000** **c. >5000**	 20 (28.5%) 40 (57.1%) 10 (14.2%)	 10 (20%) 20 (40%) 20 (40%)	 30 (25%) 60 (50%) 30 (25%)	10.28	0.005
6. Religion? **a. Muslim** **b. Christian** **c. Hindu** **d. Others**	 20 (28.5%) 0 50 (71.4%) 0	 35 (70%) 0 15 (30%) o	 55(45.84%) 0 65(54.17%) 0	20.16	0.0001

Association of anemia with obstetric and clinical factors

As shown in Table 2, Most of the participants 45 (37.5%) were primigravida and second gravida, 60 (50%) were in the 2nd trimester. Whereas 45 (37.5%) had no births yet and had <2 living children, and 29 (24,1%) had birth interval of 1-2 years. In addition, 72 (60%) had no information about anemia in pregnancy, 105 (87.5%) was not on iron supplementation and 65 (54.1%) do not have prior history of anemia in pregnancy.

Furthermore 116 (96.6%) was not having any medical illness and 39 (32.5%) were on the medication for GERD.

Table 2: Association of Obstetric and Clinical Factors with Anemia, And Calculation of P Value Using Chi Square Test.

Clinical and obstetric factors	Anemic (%)	Non-anemic (%)	Total (%)	Chi square (x2) value	P value
1. Gravida? **a. Primigravida** **b. Second** **c. Multigravida**	 30 (42.8%) 27 (38.5%) 13 (18.5%)	 15 (30%) 18 (36%) 17 (34%)	 45 (37.5%) 45 (37.5%) 30 (25%)	 4.11	 0.127
2. Trimester of current pregnancy? **a. 1st** **b. 2nd** **c. 3rd**	 20 (28.5%) 40 (57.1%) 10 (14.2%)	 10 (20%) 20 (40%) 20 (40%)	 30 (25%) 60 (50%) 30 (25%)	 10.28	 0.005
3. Number of deliveries? **a. No births** **b. <2** **c. 2-5** **d. >5**	 30 (42.8%) 27 (38.5%) 13 (18.5%) 0	 15 (30%) 18 (36%) 17 (34%) 0	 45 (37.5%) 45 (37.5%) 30 (25%) 0	 4.11	 0.24
4. Number of living children? **a. One** **b. Two or above** **c. None**	 27 (38.5%) 13 (18.5%) 30 (42.8%)	 18 (36%) 17 (34%) 15 (30%)	 45 (37.5%) 30 (25%) 30 (25%)	 4.11	 0.127
5. Type of previous delivery? **a. Normal** **b. C-section** **c. None**	 15 (21.4%) 25 (35.7%) 30 (42.8%)	 17 (34%) 18 (36%) 15 (30%)	 32 (26.67%) 43 (35.84%) 45 (37.5%)	 3.01	 0.22
6. Birth interval? **a. <1 years** **b. 1-2years** **c. 3 years and above** **d. None**	 22 (31.4%) 14 (20%) 4 (5.7%) 30 (42.8%)	 5 (10%) 15 (30%) 15 (30%) 15 (30%)	 27 (22.5%) 29 (24.17%) 19 (15.84%) 45 (37.5%)	 19.30	 0.0002

7. Have information about anemia? **a. Yes** **b. No**	 23 (32.8%) 47 (67.1%)	 25 (50%) 25 (50%)	 48 (40%) 72 (60%)	 3.57	 0.058
8. No. Of abortions? **a. 0** **b. 1** **c. >1**	 50 (71.4%) 20 (28.5%) o	 35 (70%) 15 (30%) o	 85 (70.84%) 35 (29.17%) 0	 0.028	 0.9
9. Iron supplementation on current pregnancy? **a. Yes** **b. No**	 15 (21.4%) 55 (78.5%)	 0 50 (100%)	 15 (12.5%) 105 (87.5%)	 12.24	 0.0004
10. Do you have any H/O anemia in previous pregnancy? **a. Yes** **b. No**	 20 (28.5%) 50 (71.4%)	 35 (70%) 15 (30%)	 55 (45.84%) 65 (54.17%)	 20.16	 7.10
11. If yes, had you undergone any RBC transfusion? **a. Yes** **b. No** **c. Was not so severe, so managed with Iron supplements**	 5 (7.14%) 50 (71.4%) 15 (21.4%)	 5 (10%) 30 (60%) 15 (30%)	 10 (8.3%) 80 (66.67%) 30 (25%)	 1.71	 0.42
12. Diagnosed with any medical illness? **a. Malaria** **b. HIV** **c. TB** **d. Parasitic infections** **e. None**	 4 (5.7%) 0 0 0 66 (94.2%)	 0 0 0 0 50 (100%)	 4 (3.34%) 0 0 0 116(96.67%)	 2.95	 0.56
13. Are you currently on medication for any of the following disease? **a. HTN**					

b. GERD **c. UTI's** **d. Thyroid disease** **e. None**	10 (14.2%) 20 (28.5%) 5 (7.14%) 15 (21.4%) 20 (28.5%)	5 (10%) 19 (38%) 2 (4%) 16 (32%) 8 (16%)	15 (12.5%) 39 (32.5%) 7 (5.84%) 31 (25.84%) 28 (23.34%)	4.95	0.29

Association of anemia with dietary factors:

Mass of the participants 45 (37.5%), were vegetarian. It was observed that 48 (40%) eat fruits and vegetables weekly. In addition, 44 (36%) had a habit of taking tea/coffee after meals. On the other hand, 120 (100%) women's reported no tobacco usage as shown in Table 3.

Table 3: Association of Dietary Factors with Anemia, And Calculation of P Value Using Chi Square Test.

Dietary factors	Anemic (%)	Non-anemic (%)	Total (%)	Chi square (x2) value	P value
1.Dietary pattern? **a. Vegetarian** **b. Non-vegetarian** **c. Both**	35 (50%) 20 (28.5%) 15 (21.4%)	10 (20%) 20 (40%) 20 (40%)	45 (37.5%) 40 (33.3%) 35 (29.17%)	11.59	0.003
2.Do you eat fruits and vegetables? **a. Daily** **b. Every other day** **c. Weekly** **d. Never**	19 (27.1%) 13 (18.5%) 38 (54.2%) 0	20 (40%) 18 (36%) 10 (20%) 2 (4%)	39 (32.5%) 31 (25.84%) 48 (40%) 2 (1.67%)	16.28	0.0009
3. How many times do you drink tea/coffee per day? **a. 1** **b. 2** **c. <2**	16 (22.8%) 29 (41.4%) 25 (35.7%)	28 (56%) 9 (18%) 13 (26%)	44 (36%) 38 (31.6%) 38 (31.6%)	14.66	0.000
4. Do you consume smokeless tobacco products? **a. Yes** **b. No**	0 70 (100%)	0 50 (100%)	0 120 (100%)	0	1

Association of anemia with feto-maternal complications:

Mass of the participants reported no complications during labor, whereas 29 (24%) had preterm labor. On the other hand, 65 (54%) delivered baby with no neonatal adverse outcome associated with anemia, whe-

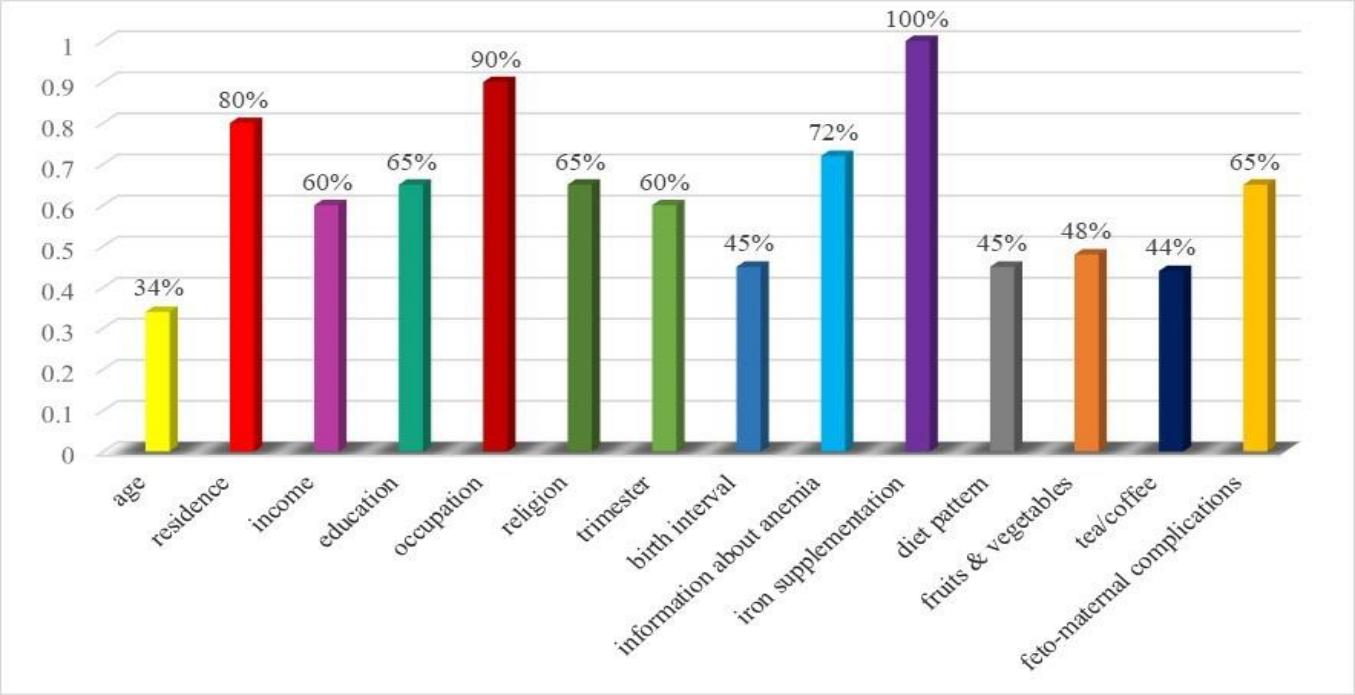
reas 29 (24%) had preterm birth babies as shown in Table 4.

Table 4: Association of Feto-Maternal Complications with Anemia, And Calculation of P Value Using Chi Square Test.

Maternal-fetal complications	Anemic (%)	Non-anemic (%)	Total (%)	Chi square (x2) value	P value
1.Do you faced any complications during labor due to anemia?					
a. Preterm labor	9 (12.8%)	20 (40%)	29 (24%)		
b. Severe postpartum hemorrhage	4 (5.7%)	10 (20%)	14 (11%)		
c. Preeclampsia					
d. Placental abruption	2 (2.8%)	0	2 (1.6%)	15.422	0.01
e. Hysterectomy	0	0	0		
f. Increased ICU admission	0	0	0		
g. None	5 (7.1%)	5 (10%)	10 (8.3%)		
	50 (71.4%)	15 (30%)	65 (54%)		
2. Was your baby delivered with any of the following neonatal adverse outcome due to anemia?					
a. Low birth weight	11 (15.7%)	15 (30%)	26 (21%)		
b. Preterm birth	9 (12.8%)	20 (40%)	29 (24%)	20.88	0.0003
c. Fetal distress	0	0	0		
d. Other	0	0	0		
e. None	50 (71.4%)	15 (30%)	65 (54%)		

As a result of the current research, the following risk factors were statistically significant with the risk of developing anemia in pregnancy by demonstrating a P value of ≤ 0.05. as shown in Figure 5.

Figure 5. 3D Column Chart Showing Statistically Significant Risk Factors for Anemia in Pregnancy with A P Value ≤ 0.05



DISCUSSION

The overall prevalence of anemia among pregnant women in the present study was found to be 58%. Similar prevalence rate was reported by NFHS-4,5 (57%, 61%) [12], Bhoomika Biradar et al (57.6%) [2] and Priyanka Kumari et al (56,7%) [4].

In addition,78.5% anemic women peripheral smear report showed microcytic/hypochromic anemia (Iron deficiency anemia), followed by 21.4% reported dimorphic anemia in peripheral smear report. This is similar to Shradha S. Maka et al [13] and Rani Hansda et al. [14].

Upon evaluating the severity of anemia, we observed that the majority of the women had moderate anemia 61.4%, followed by mild 32.8% and severe anemia 10%. This was in comparison with the study of Nigar et al [15] and Goyal et al [16] where they also reported high cases of moderate anemia among pregnant women.

Sociodemographic factors

Concerning the sociodemographic factors, majority of the women were of the age 26-30 years 35%, which is similar to the study of Romi Bansal et al [11] and Weinshet Getahun et al [17]. This could be as a result of women in reproductive age having more frequent pregnancies and having smaller birth spacing, which increases their risk of anaemia in our study [9].

Approximately 64.2% of the anemic pregnant women lived in rural areas, compared to 35.7% in urban areas which is similar to Rani Hansda (63.36%) [14], Weldemariam et al (65.9%) [18]. Locality has a significant impact on rates of literacy, education and employment. As most of them were from rural areas, 57.1% was having monthly income of 1000-5000 and had completed secondary school of education which is similar to Romi Bansal et al [11] and Priyanka Kumari et al [4], this shows that education plays a role in prevalence and awareness about disease and its prevention. Also low socioeconomic status is linked with less expenditure by abandoning regular health checkup visits and thus leading to progression of the

disease. The current study also witnessed that with increase of education level, socioeconomic status and urban residence women were less anemic.

85.7% of the anemic women were housewives, which reflects negligence of women to antenatal visits and follow ups as housewives are occupied in household chores and do not take much care of them and majority 71.4% were Hindu by religion which is in comparison with Romi Bansal et al [11], Priyanka Kumari et al [4] and Nadeem Ahmad et al [19].

In the present study age, residence, education, socioeconomic status, occupation and religion showed statistically significant association with the prevalence of anemia by demonstrating a P value of ≤ 0.05 which is similar with Rani Hansda et al [14], Priyanka Kumari et al [4], Mulambalah Chrispinus Siteti et al [10]and Subhojit Let et al [12]. However, in contrast to the present study J. Vindhya et al [23] and Bhoomika Biradar et al [2] did not find any significant association between anemia and sociodemographic factors, whereas Anuradha Sinha et al [1] did not find any association between anemia with age and religion.

Obstetric and clinical factors

Regarding obstetric and clinical history, majority of the participants 57.1% were in 2nd trimester which is similar to Romi Bansal et al [11] and Mulambalah Chrispinus Siteti et al. [10]. The increased prevalence of anaemia during the second trimester can be explained by the natural hemodilution that peaks during this time [9]. In the final two trimesters of pregnancy, a woman's daily needs for iron and folate are higher. Anaemia develops and worsens in the second and third trimesters when iron levels are already low because of malnutrition and/or repeated pregnancies [18].

In the present study, most of the women were primigravida 42.8% which is similar to Khatana A et al [20], followed by second gravida 38.5%. As most of the women were primi gravida, 42.8% had no deliveries followed by none of the living children present and no birth interval whereas 31.4% had <1-year birth interval which is in comparison to H.K Cheema et al [102] where they state that women with birth interval of <1 year are more prone to develop anemia than >3 years' birth interval. Given that the bulk of the anaemic participants came from rural areas with secondary education and low socioeconomic status, 67.1% of anaemic women were unaware about the nutritional deficiency known as gestational anaemia which affects people all over the world which is similar to Sobhna Pradhan et al [21] and furthermore 78.5% of anemic women were not on iron supplementation which is similar to Priyanka Kumari et al [4].

Reported that majority of the women were primigravida in the current study, 71.4% were having no abortions, no history of anemia in previous pregnancy and no RBC transfusion. Also 94.2% of women reported no medical illness. Furthermore 28.5% were on medication for GERD, 21.4% for thyroid disease and 14.2% for hypertension which is similar to Romi Bansal et al [11] where they reported high prevalence of anemia with present of comorbid conditions. While the present study did not find any such association.

In the present study trimester of current pregnancy, birth interval, knowledge on anemia, intake of iron supplementation showed statistically significant association with the prevalence of anemia by demonstrating a P value of ≤ 0.05 which is similar with Romi Bansal et al [11], H.K Cheema et al [22], Priyanka Kumari et al [4] and Sobhna Pradhan et al [21]. However, in contrast to the present study J. Vindhya et al [23] did not find any significant association between anemia and obstetric factors.

Dietary factors

In the present study dietary factors showed a significant influence on prevalence of anemia. Majority of the anemic women 50% were vegetarian and showed significant association between risk of developing anemia and vegetarian diet (P value 0.003) which is in comparison with Romi Bansal et al [11], H.K

Cheema et al [22], and Fekede Weldekidan et al [24] where they reported influence of vegetarian diet on prevalence of anemia. This indicate the importance of consuming meat/egg/fish chicken which are major source of heme iron.

54.2% women were on weekly intake of fruits and vegetables which reflects unbalanced diet of essential minerals, vitamins, nutrients to support increased pregnancy requirements. This is similar to Romi Bansal et al [11]. Additionally, 41.4% anemic women reported intake of tea/coffee immediately after taking meals which is similar to Romi Bansal et al (57%) [11], and Fekede Weldekidan et al (74.8%) [24]. The present study also shows significant association between anemia and tea/coffee intake (P value 0.000), as consuming tea/coffee after food affect absorption of iron. Besides this study did not showed any significant association of anemia with tobacco intake as 100% of the participants reported no tobacco usage

In the present vegetarian diet, intake of fruits, vegetables and consumption of tea/coffee after meals showed statistically significant association with the prevalence of anemia by demonstrating a P value of ≤ 0.05 which is similar with Romi Bansal [11], H.K Cheema et al [22] and Fekede Weldekidan et al. [24]

Feto-maternal complications

Majority of the anemic women were primigravida, 71.4% reported no complications during labor whereas 12.8% had preterm labor followed by 7.1% had increased ICU admission and 5.7% had severe postpartum hemorrhage. This is similar to the study of Rani Hansda et al [14], Ravishankar Suryanarayana et al [25] and Mohammed Abdelaziz Youssry et al. [26].

15.7% anemic women with a previous history of anemia in pregnancy delivered low birth weight babies followed by 12.8% who had premature delivery, which is in comparison with study of Rani Hansda et al [14], Ravishankar Suryanarayana et al [25] and Mohammed Abdelaziz Youssry et al [26]. Additionally, the present study also showed significant association of anemia with adverse feto-maternal outcomes by demonstrating a P value of ≤ 0.05.

CONCLUSION

The present research concludes that, iron deficiency anemia remains an ongoing nutritional concern for both the mother and newborn particularly in rural areas of India mostly due to poverty, less education and low socioeconomic status. Pregnant women should receive more information and guidance regarding the causes of iron deficiency anaemia, dietary modifications, the importance of taking iron supplements, and the adverse effects of neglecting to treat the condition. Regular antenatal visits should be encouraged by the physician, pharmacist and other healthcare workers in order to follow early diagnosis and treatment strategy to make sure that the pregnancy and delivery are safe.

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