MATHEWS

Research Article

Mathews Journal of Gynecology and Obstetrics

Prevalence, Risk Factors and Prescribing Trends of Iron Deficiency Anemia in Pregnancy at a Tertiary Care Hospital, India

Varsha J Galani[1,*], Nidhi N Patel[2], Shivam P Patel[2], Jensi H Rabari[2]

[1]*Department of Pharmacology, Indubhai Patel College of Pharmacy and Research Centre, Dharmaj-388430, Gujarat, India*

[2]*Department of Pharmacy Practice, Indubhai Patel College of Pharmacy and Research Centre, Dharmaj-388430, Gujarat, India*

ABSTRACT

Background: Iron deficiency anemia is one of the most prevalent nutritional problem affecting pregnant women in India. Untreated Iron deficiency anemia has significant adverse feto-maternal consequences. **Methodology:** A record based retrospective study was conducted to determine the prevalence, its associated risk factors and prescribing trends of Iron deficiency in pregnancy at a tertiary care hospital, Gujarat, India. Hb% less than 11 gm% will be considered as anemic. Demographic data, history of pregnancy, laboratory data and prescribing practice were recorded in the predesigned case report form. **Result:** Out of 350 cases, 257 cases were anemic and 93 cases were nonanemic. The overall prevalence of anemia among pregnant women was found to be 73.4%. In our study majority of the anemic cases were mild (69%) followed by moderate (23%), severe (7%) and very severe (1%). Majority of rural cases (75.87%) registered and higher proportion of anemia was found in third trimester (83.65%). Variables such as gestational age, gravida, parity, abortion, iron and folic acid supplementation during pregnancy, and complications during pregnancy had significantly associated with the prevalence of anemia. With increasing severity of anemia, hemoglobin value and red cell indices were decreased. Conclusion: High prevalence of anemia in pregnant women was observed with association of several risk factors mentioned. Hemoglobin value and red cell indices were useful tools to check level of iron deficiency anemia. Iron and folic acid tablets are most commonly prescribed during all the trimesters.

Keywords: Iron Deficiency Anemia, Prevalence of Anemia, Pregnancy, Risk Factors of Anemia, Red Cell Indices, Iron Deficiency Anemia Treatment.

INTRODUCTION

Iron deficiency anemia is the most prevailing nutritional deficiency especially in pregnancy [1]. In pregnancy iron demand is increasing very high (700-1400 mg), of which greater amount is accounted by the uterus and its contents [2]. This high demand of iron lead to depletion of maternal iron stores, which prone pregnant women at higher risk of developing iron deficiency anemia [3].

Vol No: 07, Issue: 01

Received Date: January 23, 2023

Published Date: February 06, 2023

***Corresponding Author**

Dr. Varsha J Galani

Department of Pharmacology, Indubhai Patel College of Pharmacy and Research Centre, Dharmaj-388430, Gujarat, India,
Tel: (+91) 9429161203

E-mail: vjgalani@gmail.com

Citation: Galani VJ, et al. (2023). Prevalence, Risk Factors and Prescribing Trends of Iron Deficiency Anemia in Pregnancy at a Tertiary Care Hospital, India. Mathews J Gynecol Obstet. 7(1):23.

According to WHO, <11g/dl in the 1st trimester, <10.5 g/dl in the 2nd trimester and <11 g/dl in the 3rd trimester are considered as anemia during pregnancy [4]. Maternal anemia is a severe public health problem affecting both developed and developing countries. The WHO has estimated that the prevalence of anemia in pregnant women is 14% in developed and 51% in developing countries [2]. Prevalence of anemia in India is higher according to latest data of NFHS 5 (National Family Health Survey), among pregnant women aged 15-49 years (52.2%) compared to NFHS 4 data (50.4%). Prevalence of anemia in pregnant women aged 15-49 years in Gujarat according to NFHS 5 is 69% which is quite higher than NFHS 4 data (56.5%) [5]. The prevalence of Iron deficiency anemia in pregnancy differs significantly because of variations in socioeconomic conditions, lifestyles and health-seeking behaviors across different cultures [6-9].

Untreated iron deficiency has significant adverse feto-maternal consequences [4]. It may lead to premature birth, low birth weight, fetal cognitive impairment, and fetal death. Maternal complication includes preeclampsia, antepartum hemorrhage, puerperal sepsis, and thromboembolic complications leading to subinvolution of the uterus, failure of lactation, and delayed wound healing. Maternal iron deficiency anemia is associated with increased risk for cesarean delivery, transfusion, perinatal bleeding, preeclampsia, placental abruption, antepartum hemorrhage, puerperal sepsis, poor maternal thyroid status, thromboembolic complications leading to subinvolution of the uterus, failure of lactation, poor wound healing, cardiac failure, and even death [10-13]. Therefore, identification of the risk factors contributing to anemia in pregnant mothers is vital for its prevention and control. Detection of iron deficiency anemia early during pregnancy reduces maternal and child mortality and morbidity.

In case of iron deficiency anemia, a complete cell blood count shows reduced Hb concentration, reduced mean cell volume (MCV), reduced mean cell Hb (MCH), reduced mean cell Hb concentration (MCHC), and mild thrombocytosis [14]. The gold standard for assessing iron deficiency anemia is bone marrow analysis, which is too invasive as a screening tool in routine clinical practice. Serum ferritin, serum transferrin and serum iron are good markers to diagnose iron deficiency but these too are relatively expensive assays. Compared to these, red cell indices are less invasive, less cumbersome and inexpensive tests for early detection of iron deficiency anemia [15].

The correction of iron deficiency involves an appropriate diet and iron supplementation. Oral iron replacement therapy with gradual replenishment of iron stores and restoration of hemoglobin is the preferred treatment. Parenteral iron therapy, given either by intramuscular or intravenous route, may be used if anemia is moderate or severe, if oral therapy has failed or in case of mild anemia, oral route is not tolerated or the patient tolerance is low [14]. India became the first developing country to take up the National Nutritional Anemia Control Programme to prevent anemia among pregnant women. The government of India recommends 100mg of elemental iron + 500µg of folic acid for prophylactic supplementation for minimum of 100 days starting in the 2nd trimester and double this dose for the treatment of anemia, that is, 200mg of elemental iron+1000µg of folic acid. Despite these efforts, the prevalence of anemia is 65-75% in India [2]. Thus, this study was conducted to establish evidence-based information on the prevalence of anemia, its associated risk factors and prescribing practice in pregnant women in the study area.

METHODOLOGY

A record based retrospective study was conducted at Obstetrics and Gynaecology Department at Shraddha Hospital, Borsad. After obtaining the approval from ethics committee (IEC/CHARUSAT/21/4), data for antenatal care cases registered during December 2020 to December 2021 was taken from antenatal care register and recorded in the predesigned case report form. The pregnant women cases whose age more than or equal to eighteen years with any trimester attending gynecology department were included in the study. The pregnant women having hemoglobin less than 11g/dl were included in the anemic group of the study and rest were considered as nonanemic cases. The pregnant women with antepartum haemorrhage, chronic medical illness, human immunodeficiency virus (HIV) or hepatitis B surface antigen (HBsAg) or vulnerable disease research laboratory test (VDRL) positive cases were excluded from the study. Collected data related to patient's demographic details (age and residence), obstetric history (gestation age, gravida, parity, abortion, life, history of iron and frolic acid supplements during pregnancy, and history of other complications), laboratory parameters (Hemoglobin levels, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, red cell distribution width, red blood cell, packed cell volume, serum iron, serum ferritin, total iron binding capacity (TIBC)) and treatment were entered in the Microsoft Excel spread sheet.

Hemoglobin level from case record were classified as mild (9- 10 g/dl), moderate (7-8.9 g/dl), severe (>7 g/dl) and very severe (<4g/dl). The data were analyzed through SPSS 20.0 and Chi-square test was used to find out association between variables and severity of anemia at a significance level of $p<0.05$. Descriptive statistics was calculated using frequencies and percentages.

RESULTS

A total of 350 pregnant women cases from December 2020 - December 2021 were recorded in the case report form as per inclusion and exclusion criteria and results of demographic data, obstetric history, biochemical parameters and treatment trends were analyzed. Out of 350 cases, 257(73%) women having hemoglobin less than 11gm/dl were considered as anemic and 93 women whose hemoglobin more than 11gm/dl were considered as nonanemic. Hence, the prevalence rate of anemia in the present study is 73.4%. Out of 257 anemic cases, 69% were mildly anemic (9-10.9 g/dl), 23% were moderately anemic (7.0-8.9 g/dl), 7% were severely anemic (<7g/dl) and 1% was very severely anemic (<4g/dl). Demographic characteristic (age group, residence) wise distribution of anemic (mild, moderate, severe and very severe) cases and nonanemic cases are shown in Table 1. Majority of the cases falls under middle age (25-35 years) and more number of mildly anemic patients were registered in all age groups. Three fourth study cases are from rural area and most cases were of mild anemia. Statistical analysis revealed no significant association were observed between demographic characteristics (age ($p = 0.5926$), residence ($p = 0.51903$) of pregnant women) and prevalence of anemia.

Distribution of anemic (mild, moderate, severe and very severe) cases and nonanemic cases according to obstetric history parameters are shown in Table 2. Highest numbers of cases were registered in the third trimester of pregnancy and majority of cases in all trimesters were mildly anemic. In comparison of primigravida (1 gravida) with multigravida, a greater number of cases were found with multigravida (2-≥3 gravida) with prominent mild anemia cases. Multiparous cases (2, ≥3 parity) are more observed than nulliparous (0 parity) in the present study and majority had mild anemia. Majority of cases (315) had no abortion history and from anemic cases most had mild anemia in the present study. In major part of cases mentioned one child history and from all categories of anemic cases predominantly mild anemia was observed. History of complications like acute febrile, acute gastroenteritis, convulsion, diabetes mellitus 2, eclampsia, enteric fever, generalised tonic-clonic seizures, haematuria, hypercholesterolemia, hyperemesis gravidarum, hypertension, hyperthyroidism, hypotension, hypothyroidism, obesity, oligomenorrhea, osteoarthritis, polycystic ovarian disease, severe oligohydramnios with fetal distress and upper respiratory tract infection were recorded. In majority of registered cases complications were not mentioned but in 82 cases, complications were recorded while in 48 cases, complications were not present. Majority of patients with complications had mild anemia.

From 257 total anemic cases, 138(53.69%) had history of Iron and Folic acid supplements but still suffer from anemia, while out of 93 nonanemic cases, 37(39.78%) were taking iron and folic acid supplements and 56(60.21%) were not taking regular iron and folic acid supplements. Statistical analysis revealed significant association of factors such as trimesters ($p = 0.007819$), gravida ($p = 0.0100$), parity ($p = 0.011$), abortion ($p = 0.034$) and history of complications ($p =0.0115$) with prevalence of anemia. Factors like life ($p = 0.569$) and history of Iron and Folic acid supplements ($p = 0.115$) had not significantly associated with the prevalence of anemia.

Average values of laboratory parameters such as Hemoglobin (Hb) levels, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red blood cell (RBC) and packed cell volume (PCV) were decreasing in order from mild, moderate, severe and very severe types of anemia. Whereas, values of red cell distribution width (RDW) were increasing in order from mild, moderate, severe and very severe types of anemia. In very few cases data of serum iron and serum ferritin were available, while total iron binding capacity (TIBC) test was not performed in all the cases (Table 3).

Orofer XT (Ferrous ascorbate, Folic acid, Methycobalamin) is highly prescribed treatment in all trimesters. In addition to this oral dosage form, Ferrogen Z (Ferrous Fumarate, Folic acid, Zinc Sulphate), Fericip XT (Ferrous ascorbate, Folic acid), Iron + Folic acid and Folimax (Folic acid) were prescribed for the treatment of anemia in all the trimesters. However, parenteral preparation such as Packed Cell Volume (blood cells, plasma) and Iron Sucrose were prescribed in very few patients (Table 4).

Table 1. Distribution and association between demographic characteristics (age, residence) and prevalence of anemia.

Characteristics	Mild	Moderate	Severe	Very Severe	Total Anemic	Nonanemic	Total	*p* value
Age (Years)								
18-24	78	21	6	0	105	41	146	
	(74.30%)	(20%)	(5.70%)	0%	(40.90%)	(44.10%)	(41.70%)	
25-35	93	32	10	2	137	46	183	0.5926
	(67.90%)	(23.30%)	(7.30%)	(1.50%)	(53.30%)	(49.50%)	(52.30%)	
>35	7	5	3	0	15	6	21	
	(46.60%)	(33.33%)	(20%)	0%	(5.83%)	(6.45%)	(6%)	
Residence								
Rural	140	39	15	1	195	68	263	
	(71.80%)	(20%)	(7.70%)	(0.50%)	(75.90%)	(73.10%)	(75.10%)	0.519
Urban	38	19	4(6.5%)	1	62	25	87	
	(61.30%)	(30.60%)		(1.60%)	(24.10%)	-26.90%	(24.90%)	

Table 2. Distribution and association between obstetric history (gestational age, gravida, parity, abortion, life) and prevalence of anemia.

Characteristics	Mild	Moderate	Severe	Very Severe	Total Anemic	Nonanemic	Total	*p* value
Gestational age								
1st Trimester	12 (70.6%)	3 (17.6%)	2 (11.8%)	0 (0%)	17 (6.6%)	14 (15.1%)	31 (8.9%)	
2nd Trimester	11 (48%)	8 (32%)	6 (24%)	0 (0%)	25 (9.7%)	7 (7.5%)	32 (9.1%)	**0.0078**
3rd Trimester	155 (72.1%)	47 (21.9%)	11 (5.7 %)	2 (0.9%)	215 (83.7%)	72 (77.4%)	287 (82%)	
Gravida								
1	44 (77.2%)	9 (15.8%)	4 (7.0%)	0 (0%)	57 (22.2%)	38 (40.9%)	95 (27.1%)	
2	77 (66.9%)	28 (24.4%)	10 (8.7%)	0 (0%)	115 (44.7%)	27 (29.0%)	142 (40.6%)	**0.0100**
≥3	57 (67.1%)	21 (24.7%)	5 (5.9%)	2 (2.4%)	85 (33.1%)	28 (30.1%)	113 (32.3%)	
Parity								
0	15 (88.2%)	1 (5.9%)	1 (5.9%)	0 (0%)	17 (6.6%)	12 (12.9%)	29 (8.3%)	
1	85 (70.2%)	26 (23.2%)	10 (8.3%)	0 (0%)	121 (47.1%)	27 (29.0%)	148 (42.3%)	
2	66 (68.8%)	22 (22.9%)	7 (7.3%)	1 (1.0%)	96 (37.4%)	32 (34.4%)	128 (36.6%)	**0.0114**
≥3	12 (52.2%)	9 (39.1%)	1 (4.3%)	1 (4.3%)	23 (8.9%)	22 (23.7%)	45 (12.9%)	

Abortion								
0	155 (68.6%)	53 (23.5%)	17 (7.5%)	1 (0.4%)	226 (87.9%)	89 (95.7%)	315 (90%)	
1	12 (60%)	5 (25%)	2 (10%)	1 (5%)	20 (7.8%)	2 (2.2%)	22 (6.3%)	**0.0348**
2	11 (100%)	0 (0%)	0 (0%)	0 (0%)	11 (4.3%)	2 (2.2%)	13 (3.7%)	
Life								
0	25 (86.2%)	3 (10.3%)	1 (3.4%)	0 (0%)	29 (11.3%)	15 (16.1%)	44 (12.6%)	
1	88 (69.3%)	29 (22.8%)	10 (7.9%)	0 (0%)	127 (49.4%)	36 (38.7%)	163 (46.6%)	
2	53 (64.6%)	20 (24.4%)	7 (8.5%)	2 (2.4%)	82 (31.9%)	34 (36.6%)	116 (33.2%)	**0.5697**
≥3	12 (63.2%)	6 (31.6%)	1 (5.3%)	0 0%)	19 (7.3%)	8 (8.6%)	27 (7.7%)	
Complications								
Yes	43 (65.2%)	17 (25.8%)	5 (7.6%)	1 (1.5%)	66 (25.7%)	16 (17.2%)	82 (23.4%)	
No	13 (44.8%)	12 (41.4%)	4 (13.8%)	0 (0%)	29 (11.3%)	19 (20.4%)	48 (13.7%)	**0.0396**
Not mentioned	122 (75.3%)	29 (17.9%)	10 (6.2%)	1 (0.6%)	162 (63.0%)	58 (62.4%)	220 (62.9%)	
History of Iron and Folic acid supplements								
Yes	91 (65.9%)	39 (28.3%)	8 (5.8%)	0 (0%)	138 (53.7%)	37 (39.8%)	175 (50%)	
No	87 (73.1%)	19 (15.9%)	11 (9.2%)	2 (1.7%)	119 (46.3%)	56 (60.2%)	175 (50%)	**0.0115**

Table 3. Average distribution of laboratory parameters in anemic and nonanemic cases.

Lab. Parameters	Mild	Moderate	Severe	Very severe	Total anemic	Nonanemic
Hb(12-15.5g/dl)	10.0 ± 0.04	8.13 ± 0.07	5.88 ± 0.16	3.9 ± 0.07	9.23 ± 0.08	11.83 ± 0.06
MCV(82-98fl)	75.9 ± 0.61	71.1 ± 1.26	68.5 ± 2.01	61.1 ± 0.7	74.19 ± 0.56	82.4 ± 0.66
MCH(27-33pg)	23.9 ± 0.24	22.7 ± 1.05	20.2 ± 0.71	19.9 ± 0.1	23.35 ± 0.3	28.34 ± 0.2
MCHC (32-36g/dl)	31.3 ± 0.29	28.8 ± 0.54	28.2 ± 0.69	28.6 ± 0.98	30.51 ± 0.25	33.3 ± 0.19
RDW (11-14%)	15.7 ± 0.14	17.0 ± 0.30	18.2 ± 0.67	20.7 ± 0.31	16.26 ± 0.14	14.11 ± 0.14
PCV (39-52%)	32.9 ± 0.22	31.6 ± 0.47	30.0 ± 1.03	30.2 ± 0.70	32.39 ± 0.21	37.05 ± 0.35
RBC (4.6-6.0 millions/cmm)	4.38 ± 0.03	3.99 ± 0.06	3.78 ± 0.13	3.45 ± 0.31	4.24 ± 0.03	4.72 ± 0.04
Serum Iron (60-170µg/dL)	-	51.2 ± 0	53.16 ± 0.72	54 ± 2.75	1.65 ± 0.57	-
Serum Ferritin(12-150µg/mL)	-	160.9 ± 0	127.3 ± 0.94	169.5 ±7.42	4.42 ± 1.65	-

Table 4. Treatment distribution according to trimesters.

Treatment	1st Trimester	2nd Trimester	3rd Trimester	Total
No Treatment	4	2	22	28
Iron + Folic acid	2	1	21	24
Iron Sucrose	0	0	5	5
Fericip XT	1	2	5	8
Ferrogen Z	1	6	37	44
Folimax	6	2	10	18
Orofer XT	4	7	107	118
PCV	0	4	8	12
Total	18	24	215	257

DISCUSSION

Anemia is a known public health problem affecting mainly the developing countries, especially anemia in pregnancy, which may lead to increased maternal and perinatal morbidities. Among South Asian countries, India has the highest prevalence of anemia in pregnancy [16]. The present study revealed high prevalence of anemia 73.4% in the Central Gujarat region of India. Prevalence of anemia in pregnancy was reported 75.2%, 81.8% and 81.8% respectively in the studies done by Raj *et al*., Bansal *et al*. and Kumar *et al*. [17-19]. Thus, result of the present study is comparable with the studies of other parts of India. High prevalence of anemia among pregnant women in this study may be explained by the distribution of socioeconomic status of the population as majority of patients were from rural area. Additionally, majority of cases enrolled in the hospital were in third trimester in which fetal growth and red blood cell expansion increases the prevalence of anemia [10,20].

The severity of anemia was graded as per WHO classification of anemia [21]. Most cases of anemia were of mild degree (69%), followed by moderate degree (23%), severe degree (7%) and very severe degree (1%). Similar results are observed in the other studies of India [17,22,23]. As per our study, majority of anemic patients belonged to the age group of 25-35 years (53.30%) which is identical to the studies conducted by Bansal *et al*. (48.4%), and Acheampong *et al*. in which 48.4% and 49.2% cases belonged to young age group respectively [2,23]. About 75.87% of anemic pregnant women belonged to rural area while 24.12% from the urban area which is similar to the study done by Bansal *et al*., in which 68% rural population and 32% urban population reported [2]. It is also comparable with another study conducted by Nigar *et al*., in which 72.4% of cases were belonged to rural area and 27.6% were from urban area [2,16].

Age of current pregnancy (trimester) is an important variable, which shows a significant association with anemia in the current study. The risk of developing anemia increases with the age of pregnancy (trimester). The risk of developing anemia was higher in third and second trimester when compared with those in the first trimester. In our study 83.65% prevalence of anemia was observed in third trimester. This finding is consistent with a study done by Addis Alene *et al*. (2014), which reported that prevalence of anemia is higher in the third trimester [24]. Highest prevelance of anemia is observed in second gravida (44.74%) and third gravida (33.07%) as compared to primigravida (22.17%) cases in the present study, which is alike to the study done by Nigar *et al*. (2020) in which prevalence of anemia was higher in second gravida (58.3%) as compared to primigravida (32.7%) [16]. The risk of developing anemia in pregnant women is increased with multigravida than primigravida [24].

Women with prior pregnancy sustain a 500-600 mg iron loss per pregnancy, which is increased by hemorrhage after delivery. Iron deficiency is, therefore, definitely more common as parity increase. In the present study, significant association between anemia and parity was found which was similar to the studies done by Acheampong *et al*. and Mirzaie *et al*. [23,25]. Ayano and Amentie also concluded that multiparous women had higher risk of anemia [26]. Higher parity was documented in a number of studies as a cause of anemia in pregnancy [27,28]. Likely reason to the high prevalence of anemia among multiparous women is that women might get pregnant with low levels of nutrients due to

the reduction of reserves of the mother in prior pregnancies and lactation periods. In the present study, 31 subjects were anemic who had history of abortion as compared to 226 anemic subjects who did not have any history of abortion. These findings are correlating with a study conducted by Bansal *et al*. [2].

The risk of developing anemia increased in pregnant women who did not receive iron supplementation during pregnancy when compared with those who received iron supplementation during pregnancy. But in the present study, over 50% of pregnant women already had on iron and folic acid treatment still found mild anemic. This finding was contrasting to the research of Addis Alene et al. [24]. This finding was contrasting to the observations made in several studies that documented a reduction in the preva¬lence of anemia at the end of pregnancy after routine supple¬mentation of iron to pregnant women [29,30]. The probable reason may be majority of cases in our study were from third trimester and iron demand will increase in third trimester [3]. Therefore, for anemia intervention to be most effective, it is important that women should attend antenatal clinics in the first trimester of their pregnancies. In this study, only 8.9% of women had their first antenatal care visit in the first trimester, and hence, most pregnant women missed anemia interventions. Data in the medical records of women did not allow us to conclude about all etiologies of persistent ane¬mia. The possible explanation why some pregnant women did not benefit from supplementation is that most of them could have been suffering from deleterious effects of undiagnosed medical disorders and were possibly anemic before pregnancy. Therefore, iron and folic acid supplementation is an important part of anemia control program, but supplements should be viewed as one of the several tools in the battle against anemia.

Iron deficiency anemia can be suspected when there is decreased hemoglobin level, microcytic hypochromic erythrocyte morphology and reduced red blood cell indices i.e., PCV, MCV, MCH, and MCHC [31]. The normal references range for mean corpuscular volume is 80–100 fl and mean corpuscular hemoglobin concentration is 320–360 g/l. The patient's cells are said to be microcytic and hypochromic, respectively, when these values are less than the normal reference range [32]. The mean corpuscular volume (MCV) is decreased, in iron-deficiency anemia [33,34]. The red cell distribution width is a measure of the variation of red blood cell width and is used in combination with the mean corpuscular volume to distinguish anemia of mixed cause from that of a single cause. The normal reference range is 11–14%; an elevated red cell distribution width value signifies a variation in red cell size, which is known as anisocytosis. The red cell distribution width may be elevated in the early stages of iron deficiency anemia. Iron studies diagnostic for iron deficiency anemia consist of a low hemoglobin (<7.4 mmol/l in women), a low serum iron (<7.1 µg/l), a low serum ferritin (storage form of iron) (<30 ng/l), a low transferrin saturation (<15%), and a high total iron-binding capacity (>13.1 µmol/l) [35,36]. In the present study, fall in haemoglobin, MCV, MCH, MCHC, RBC, PCV values were observed with increasing severity of the anemia. While a rise in the RDW, serum ferritin values were observed with increasing severity of the anemia. However, serum iron values of all types of anemic groups were decreased compared to normal reference range. Iron deficiency can be predicted in early stages using haemoglobin and red cell indices, which is much less expensive. This may be a useful method in areas with limited resources and a high prevalence of iron deficiency [37]. Serum ferritin measurements provide a reliable indication of early iron deficiency during pregnancy [38].

Oral iron supplements offer a more robust avenue for iron repletion. The most commonly prescribed preparation, the ferrous salts, includes ferrous sulfate, ferrous gluconate, and ferrous fumarate. These ferrous (Fe+2) forms are more soluble than the dietary ferric (Fe+3) form, with twice the absorbability [39]. In our study, Orofer XT (Ferrous ascorbate, Folic acid, Methycobalamin), Ferrogen Z (Ferrous Fumarate, Folic acid, Zinc Sulphate), Fericip XT (Ferrous ascorbate, Folic acid), Iron + Folic acid and Folimax (Folic acid) were more prescribed oral dosage form for the treatment of anemia in all the trimesters. However, parenteral preparation such as packed cell volume (blood cells, plasma) and Iron Sucrose were also prescribed in the very few patients.

CONCLUSION

High prevalence of anemia in association with several risk factors was observed in the present study. Identification of risk factors, early antenatal care visits and early detection of anemia during pregnancy by hemoglobin and red cell indices should be wor¬thy to allow adequate time for restoring iron stores for prevention of feto-maternal complications. Awareness regarding National Nutritional Anemia Control Programme and focus on Iron and folic acid tablets supplementation can reduce number of mild anemic cases observed in the study area.

ACKNOWLEDGEMENT

Authors thank Dr. Shavingi Gondaliya, Gynecologist, Shraddha Hospital, Borsad, Gujarat for her guidance and support for the data collection of this research work.

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