Assessment of anemia in pregnant women at a tertiary care centre in Western Maharashtra, India

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Abstract

Introduction: Deficiency of anemia is a prevalence cause of nutritional deficiency, lacking intake of iron-rich food and lower bioavailability of consumed iron required during pregnancy.

Objective: To assess the rate in pregnant women with lower haemoglobin for the determination if cause of anemia and to calculate daily caloric intake of anemia.

Materials and Methods: A tertiary care health institute based study carried out with enrolled patients from January 2007 to June 2009. A total of 113 pregnant women with low haemoglobin concentration, and less and controlled group respectively were included in the study.

Results: Out of 113 pregnant women divided into two groups, in group one, 30 pregnant women had haemoglobin concentration of 5gm% and group two, 83 pregnant women had haemoglobin concentration between 5.1 to 7gm%. The duration of pregnancy anemia detection were non significance (p = < 0.06327) and quantitative calorie intake deficit were find highly significant (p = 0.000004) between all groups. The types of anemia were detected in both groups are Microcytic hypochromic, Dimorphic, Megaloblastic, Normocytic anemia. Hence, higher cause of anemia in both groups due to nutritional deficiency. Total 55.56% pregnant women presented with 60-80 ug/dl serum iron level. Overall 3 maternal deaths (2 deaths in group 1 and 1 death in group 2) were resulted out of 113 pregnant women.

Conclusions: The higher rates of mortality were detected in lower haemoglobin level group, which shows high risk mortality in pregnant women with low level of blood.

Keywords: Anemia, Haemoglobin, Iron deficiency, Mortality, Nutrition.

Introduction

The World Health Organization (WHO) reported, from the develop countries 23% pregnant women are anemic.[1] In 2010, the global anemia occurrence was estimated to be 32.9%, resulting in 68.4 million years women lived with disability.[2] In India anaemia is the universal haematological disorder occurring during pregnancy. Anemia is a common disease in women of reproductive age and especially during pregnancy. A condition in which the number of red blood cells (RBCs) lower or oxygen-carrying capacity of RBCs were reduce to meet the body normal physiologic functions. Anaemia is related by way of increased pre-eclampsia (31.2%), pre-term labour (28.2%), and maternal sepsis.[3-5] It has occurs major problem for the obstetricians and gynaecologist for the management of pregnant women delivery cases with regard to maternal as well as foetal health.[6] Anaemia is a physiological process of pregnancy in mild degree, but becomes pathological if left undetected and untreated.

The main causes responsible for the deficiency of iron included lacking intake of iron-rich foods and lower bioavailability of consumed iron in relation to require during pregnancy.[7] The need for iron increases about minimum six to seven times from early pregnancy to the late pregnancy.[8] A small reduction in haemoglobin (Hb) is a usual physiological consequence of the raise in blood Plasma volume during the pregnancy.

Normally, after an primary increase (due to the cessation of menstruation), the levels of Hb decrease by around 20 g/l and achieve their lowest level during the second trimester, returning to pre-pregnancy levels as the pregnancy advances toward term.[9,10]

Maternal anemia influences postpartum emotion and cognition, and a reduction in hemoglobin level has been initiate to be associated with postpartum depression.[11,12] In pregnancy with severe anaemia, there is an increased risk of premature delivery and increased foetal mortality.[13] A study reported the mortality rate of fetal 50%, 28% and 24% at 7, 8 and 9-month, respectively of gestation.[14]

Targeted iron supplementation, a fully iron-rich diet, can improve iron deficiency. However, the inconsistency of bioavailable iron compounds limits its value against nutritional iron deficiency. Therefore, laboratory process of iron stores must be utilized to establish iron deficiency and monitor treatment. The consequences of iron deficiency anemia have been widely studied. However, there residue a lack of data about its effects on patient's wellbeing.[15]

However, the present study was carried out to assess the rate in pregnant women with lower haemoglobinlevel for determination the causes of anaemia and to calculate daily caloric intake of anaemic patients and to determine the deficit as perICMR (Indian council of medical research) recommendations.

Materials and Methods

From January 2007 to June 2009, this study was carried out in a multi-speciality tertiary care health institute named Lokmanya Hospital, Pimpri-Chincwad, Pune, Maharashtra, India in to the department of Obstetrics andGynaecology to find out its main objective the feto-maternal outcome in pregnancies with severe anaemia.

A total of 113 pregnant women with haemoglobin concentration of 7 gm% and less were included in the study and investigated. Fifty four pregnant women with haemoglobin concentration of 11gm% or more served as controls. Haemoglobin concentrations of 7 gm% were taken as the cut off limit for severe anaemia.

Inclusion Criteria

All anaemic pregnant women were included in the study at whatever stage the anaemia was detected. Even if the anaemia was detected within one week of expected date of delivery, the pregnant woman was included in the study.

Exclusion Criteria

Acute cases of obstetrical haemorrhage as in antepartum and postpartum haemorrhage were excluded.

The study group was further sub-divided into two sub groups:

1. Pregnant women with haemoglobin of 5 gm% or less and
2. Pregnant women with haemoglobin of 5.1 to 7 gm%

All the study group patients being severely anaemic were admitted for receiving blood transfusion and for investigations. After stabilization of the general condition and increase in haemoglobin above 7.5 gm% they also received parenteral haematinics and oral haematinics later on. These patients were followed up till they delivered babies and outcome of the mother and the baby was noted wherever possible.

The following data was collected during follow-up like; baseline and demographic characteristic of patients. All the parameters which come under before the delivery or during the pregnancy were analyzed. Moreover, biochemical investigations were performed for the analysis of serum level and iron binding capacity.

All patients' baseline and demographic information were collected during enrolment period. The following data were collected name, age, residential detail for emergency contact, registration number which was given by tertiary care center, patient occupation, date of delivery and discharge.

All patients' medical history was determined during the time of enrolment. The following detailed medical parameters were observed.

1. Present history regarding the period of amenorrhea,
2. The last menstrual period,
3. The expected due date, parity and onset of symptoms.
4. Past history with special reference to anaemia in the non pregnant state and previous pregnancy.
5. Past history of KOCH'S, haemoptysis, haematuria, haematemesis, haematochesia, malaria, worm infestation, etc. was elicited.
6. Family history of anaemia, sickle cell anaemia and thalassemia was elicited.
7. Obstetric and menstrual history with special reference to past history of menorrrhagia and ploymenorrhagia was noted.
8. Dietary history and calculation of daily caloric intake (approximately in 24 hours).

Results

A total of 113 pregnant women patients having haemoglobin less than or equal to 7gm% were included in this study. Thirty (26.5%) patients had haemoglobin concentration of 5gm% or less belong to group 1.The patients 83 (73.45%) had haemoglobin concentration between 5.1 to 7gm% belonged to group 2. Those above 11gm% were taken as control group (Fig. 1).

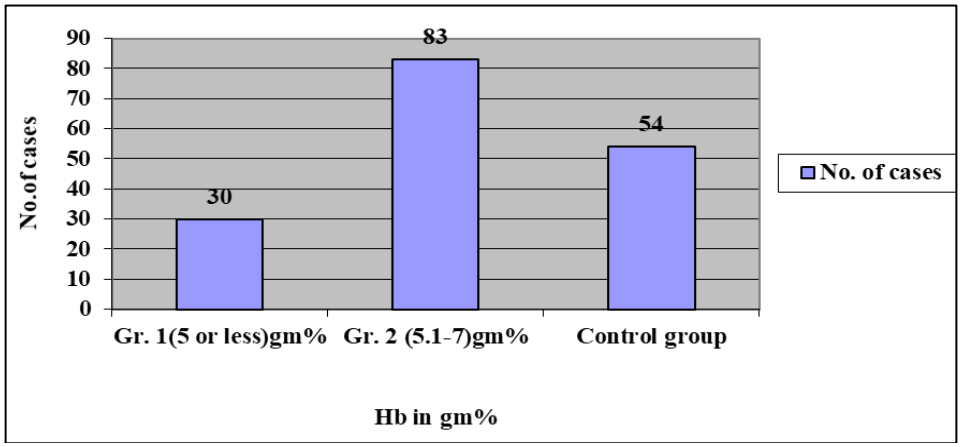

Fig. 1: Distribution of cases according to haemoglobin

When the chi-square test was applied it is observed that, there is significant difference among the various age groups of cases as well as controls
The odd's ratio calculated by different permutations and combinations (.Table 1)

(As indicated in the footnote) between the age groups. a= 12.51 which indicates more risk of anemia in the age group of <20 years as compared to 21-25 age group. b= 0.17 which indicates there is less risk of anemia in the age group of 26-30 years as compared to 31-35 years.

Table 1: Distribution of cases according to age

S. no.	Age in years	Anaemic patients	Percentage	Control	Percentage
1	≤20*	26	23.01	01	1.9
2	21-25*	54	47.79	26	48.1
3	26-30#	27	23.89	26	48.1
4	31-35#	6	5.31	01	1.9
Total		**113**	**100**	**54**	**100**
$\chi 2 = 6.865$ d. f. = 1 p = 0.0087 Significant; Odd's ratio = 12.51* (a = Sr. No. 1: 2); Odd's ratio = 0.17# (b = Sr. No. 3: 4)					

Table 2: Duration of pregnancy at detection of anaemia

Duration of pregnancy (in Weeks)	Gr. 1 Hb=5g%	Gr. 2 Hb.5.1-7g%	Total	Percentage
12-27	8	24	32	28.2
28-35	9	26	35	31.0
36-40	4	24	28	24.8
Delivery before admission	9	9	18	16.0
Total	**30**	**83**	**113**	**100**
$\chi 2 = 7.288$; d. f. = 3; p = < 0.06327 Not Significant.				

The chi-square indicated no statistical significance in the duration of pregnancy at detection of anemia**Table 2**.

Table 3: Quantitative Calorie intake DEFICIT

DEFICIT in Kcal	Gr. 1	Gr. 2	Total	%	Control	%
No Deficit	-	-	-	-	-	-
=500	2	3	5	4.42	16	22.2
1000	2	14	16	14.16	38	70.4
1500	24	62	86	76.12	-	-
1500	2	4	6	5.3	-	-
$\chi 2 = 21.11$; d. f. = 1; p = 0.000004; Highly Significant; Odd's ratio = 0.11						

After applying Chi-square test, it is observed that, there is statistically highly significant difference in quantitative calorie deficit between cases and controls Table 3.

The odd's ratio calculated, which indicates marginally less risk of anemia in <500 quantitative calorie deficit group as compared to higher quantitative calorie (>500) deficit group.

Table 4: Types of Anaemia

Types of Anaemia	Gr. 1	Gr. 2	Total	%
Microcytic hypochromic	17	58	75	66.4
Dimorphic	8	9	17	15.0
Megaloblastic	4	5	9	8.0
Normocytic	1	11	12	10.6
Total	**30**	**83**	**113**	**100**

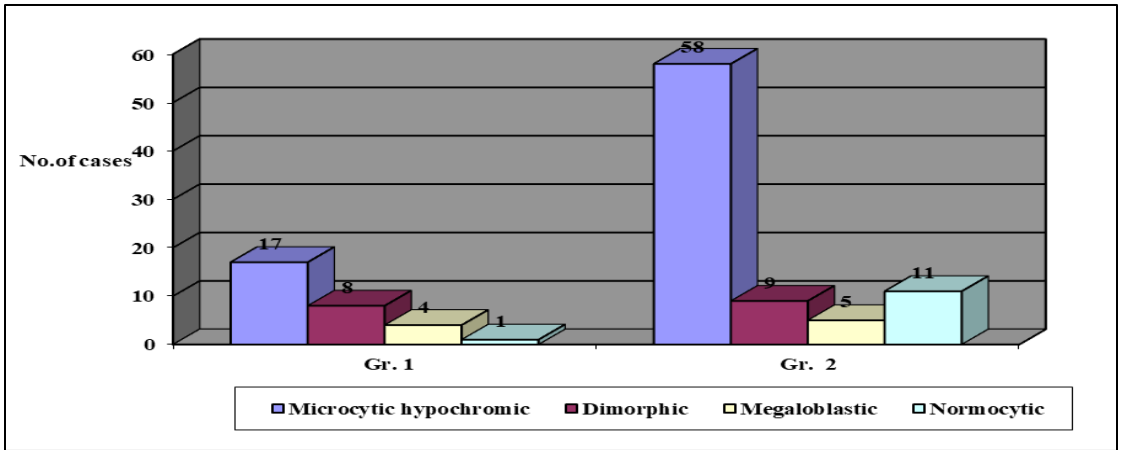

Fig. 2: Types of anemia

The given Table 4 and Fig. 2 had shown the various types of anaemia. In the present study microcytic hypochromic anaemia was found in 75 (66.4%) of cases. While 15% had a dimorphic picture, and 8% had megaloblastic and 10.6% had a normocytic picture.

Table 5: Cause of anemia

Causes	Gr.1	Gr. 2	Total	%
Nutritional	21	73	94	83.2
Worm infestation	3	2	5	4.42
Infections	4	4	8	7.08
Chronic blood loss	1	3	4	3.54
Sickle cell anaemia	0	1	1	0.68
Bone marrow depression	1	0	1	0.88
Total	**30**	**83**	**113**	**100**

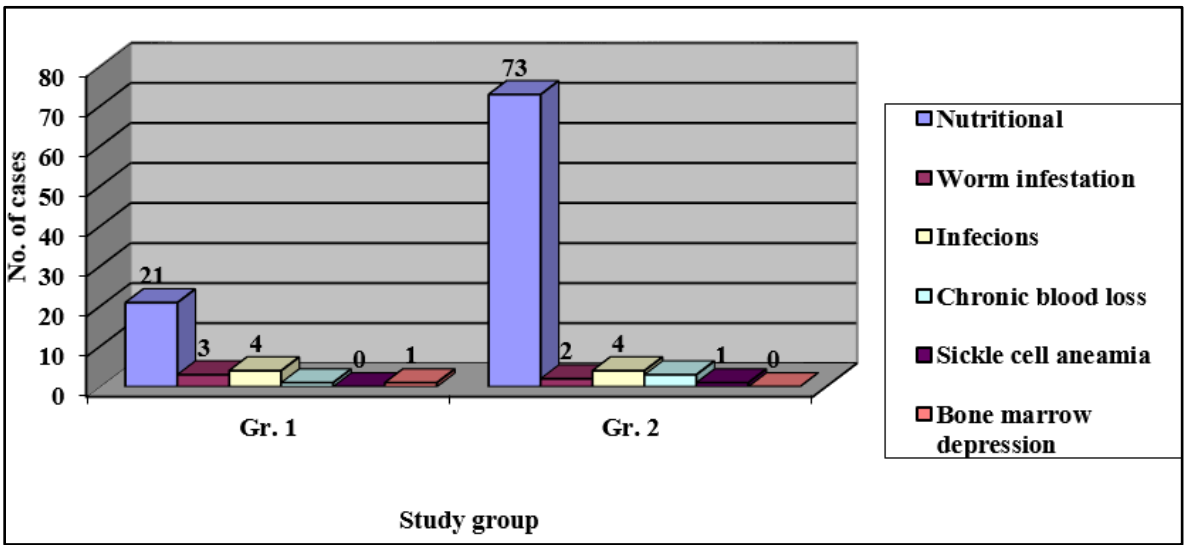

Fig. 3: Cause of anemia

The Table 5 and Fig. 3 shows the causes of anaemia. The incidence of nutritional anaemia was 83.2%. It was the most common cause of anaemia and was also associated with the other causes of anaemia.

Apart from poor nutrition, infection too accounted for a significant number of patients (7.08%) whose anaemia was due to infection suffered from malaria whereas the rest five of them had chronic urinary tract infection.

Table 6: Serum iron levels in the anaemic groups

S.Ironin ug/dl	Gr. 1	Gr. 2	Total	%
60-80	4	46	50	55.56
40-60	18	19	37	41.11
< 40	3	0	3	3.33
Total	**25**	**65**	**90**	**100**

The Table 6 shows the serum iron level in anaemic mother. We found 19 patients in Group II had serum iron levels between 40-60 ug. There were 3 maternal deaths amongst one hundred and thirteen patients (2.86/100 birth). Out of them one belonged to group II while two patients belonged to group 1. A total of 113 patients with haemoglobin less than or equal to 7gm% were included in the study group 54 patients with haemoglobin greater than or equal to 11gm% served as control. Another 54 patients (47.79%) in the study group belonged to the age group between 21 to 25 years whereas 26 patients (48.1%) in the control group belonged to the age group between 26 to 30 years. In the study group 7 patients (6.19%) had parity five and above whereas none in the control group had so high parity. Most of the anaemic patients belonged to the lower income class, had a poor or no antenatal care and had a very low calorie intake. Nutritional deficiency was an important cause of anaemia, mostly due to poverty, ignorance, infection and infestations. The anaemic patients due to multiple deficiencies had a lower serum protein concentration, low serum iron levels and a lower haematocrit. The incidence of iron deficiency was quite high (66.4%) followed by dimorphic variety (15%). Anaemic mothers had a very high incidence of preterm deliveries (23%). They also had a high incidence of low birth weight babies (41.59%).The men birth weight in babies of anaemic mothers ranged from 1.8 to 2.2 kg, whereas it was 2.8 kg in control group. Thus roughly there was a difference of 600gm to 1000gm. Maternal mortality in the present series was 2.86/100.

Discussion

There are the larger numbers of physicians or practitioners average 30% are seeing moderate anemia in majority of pregnant women. It is widespread belief that anaemia adversely affects pregnancy and its outcome. In the present study 113 pregnant patients having haemoglobin less than or equal to 7gm% were studied. Another 54 patients having haemoglobin greater than or equal to 11gm% served as control.

Maternal mortality due to anaemia presents 2.86% in our study this result was less than that obtained by K. Menon et al in 1965 and K. Subaramaniam et al in 1970. According to K. Menon (1965) reported 20% maternal deaths due to anaemia and in another 20% of maternal deaths it was an associating factor. Also, found serum proteins to vary from 5.2- 5.6 gm% inseverely anaemic patients. K. Menon (1965) found serum proteins to vary from 5.2- 5.6 gm% in severely anaemic patients.

These finding by various worker are tabulated below.[16] K. Subramanian (1970) noted that anaemia was responsible for 18.75% of the maternal deaths. Cardiac failure and sepsis was the cause of the deaths in the present study. K. Subramaniam also reported serum iron levels to vary from 30-70 ugm/dl in severely anaemic patients. Also observed 58.8% incidence of worm infestation in his studies.[17]

Thus, the present series of observation confirms the earlier observation, that nutritional deficiency is the commonest cause of anaemia in pregnancy. No antenatal care further worsens the outcome of pregnancy. The observations show that a poor quality diet is different in all essential nutrients leading to deficiency of both proteins and other erythropoietin nutrients, especially iron. S. Rathee et al (1987) observed that anaemia was due to nutritional cause in 84% of their patients 4.3% Due to malaria and 12.4% due to worm infestation respectively.[18]

Anaemia in the mother causes a lot of complications like heart failure and sepsis. In the baby, anaemia causes prematurity, low birth weight and a high perinatal mortality. Anaemia is most commonly accompanied by malnutrition. Malnutrition is a man made disease. It begins quite commonly in the womb and ends in the grave.[19] Malnutrition is largely a product of poverty, ignorance, inadequate education, lack of knowledge regarding the nutritive value of food, poor inadequate sanitary environment, large family size etc. These factors bear most directly on determining the nutrition education and the quality of life.[20]

Conclusion

Anaemia is one of the most frequent complications related to pregnancy. Normal physiologic changes in pregnancy affect the haemoglobin (Hb), and there is a relative or absolute reduction in Hb concentration. The most common true anaemia's during pregnancy are iron deficiency anaemia (approximately 75%) which is more common in women who have inadequate diets and who are not receiving prenatal iron supplements. Anaemia with haemoglobin levels less than 6 gm/dl is associated with poor pregnancy outcome. Nevertheless, a mild to moderate iron deficiency does not appear to cause a significant effect on foetal haemoglobin concentration. In an iron-deficient state, iron supplementation must be given and follow-up is indicated to diagnose iron-unresponsive anaemia's.

Timely blood transfusion can definitely save maternal lives. In the present era no mother should ever die from a preventable condition like anaemia.

Acknowledgement

We are very much thankful to our respected faculty members who participated in the study and contributed their valuable reporting.

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